Chemical Age

DEVELOPMENTS IN FERTILISER GRANULATION
(page 877)

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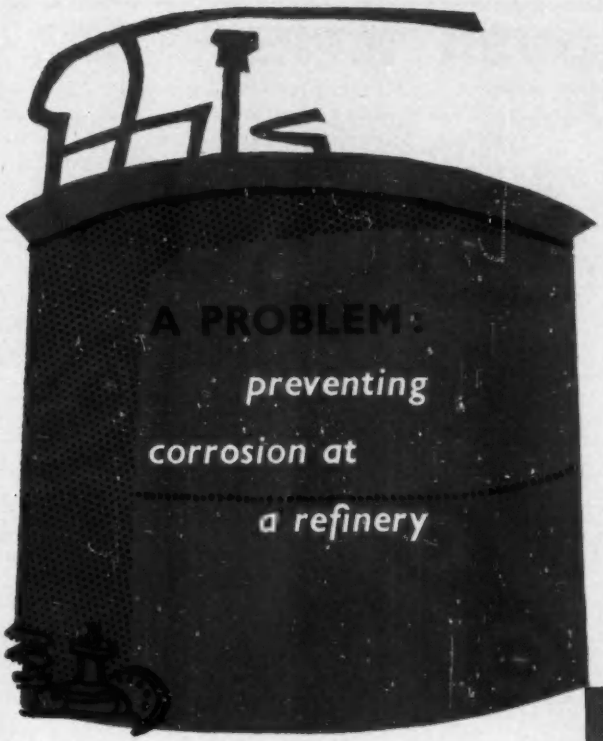

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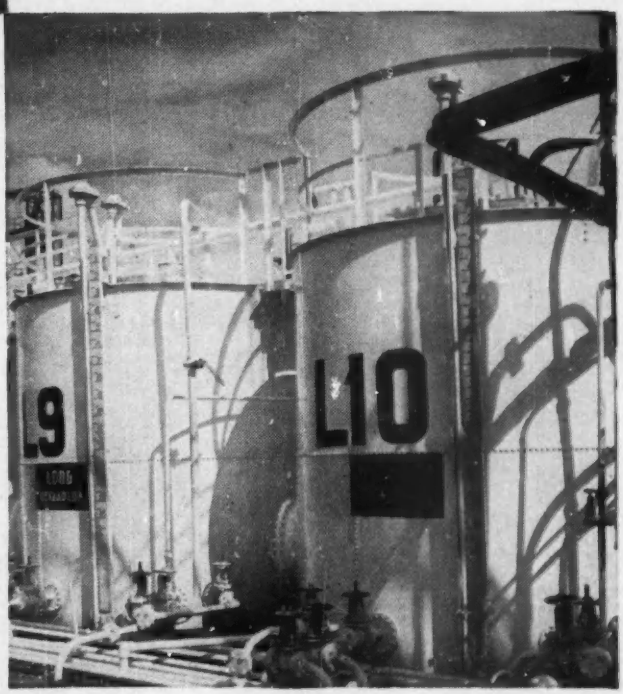

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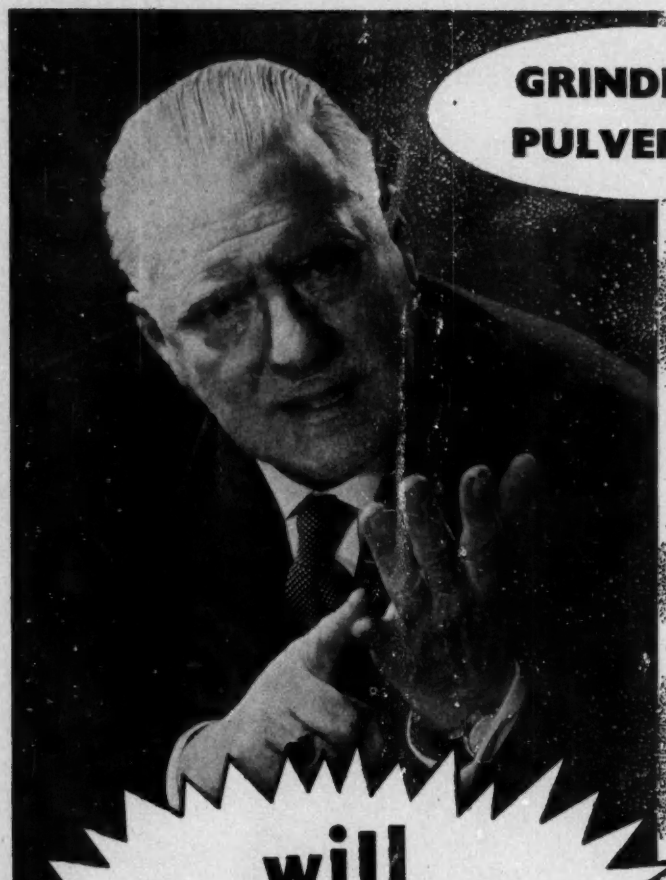

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Telephone: FLEet Street 3212 (26 Lines)
Telegrams: Allangas - Fleet - London

Editor M. C. HYDE
Manager H. A. WILLMOTT
Director N. B. LIVINGSTONE WALLACE

Midlands Office
Daimler House, Paradise Street, Birmingham. [*Midland* 0784-5]

Leeds Office
Martins Bank Chambers, Park Row, Leeds 1. [*Leeds* 22601]

Scottish Office
116 Hope Street, Glasgow, C2. [*Central* 3954-5]

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CHEMICAL AGE

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URANIUM DOUBTS

WHAT is the possible future for the uranium industries of the world? This is a question that is giving rise to much thought at the present time, particularly as one would-be uranium producer, Klerksdorp Consolidated Goldfields in South Africa, has recently received a rebuff when a loan to establish suitable uranium extraction plant was sought.

Estimated requirements for uranium for Britain's 6 million kW power programme are 10,000 tons of uranium metal as initial charge, which will have to be replaced approximately every 2½ years. In Western Europe the Euratom countries plan to be producing 15 million kW of electrical energy from their atomic power stations by 1967, using an estimated 6,000 tons a year.

There are now indications, however, that despite the setting up of atomic power stations in this country and Europe, there may well be an over-supply of uranium in the next year or so.

At present natural uranium has a slight edge as regards price on enriched fuel favoured by the US. While the price of uranium remains favourable, reactors will be built to use this material. But the price difference is not great and it is considered that the cost of enriched material can be reduced.

In Europe there have been, from time to time, announcements of domestic production of uranium, that is, from 'home' ores in Germany, where some prospecting and production has taken place. In France there are similar activities.

More recently a note on Sweden's uranium interests suggests that Stockholm, Sweden's capital, will probably be the first capital in the world to have atomic heating in its homes and offices. Although at present importing uranium, Sweden is already extracting uranium from her shale deposits. The low uranium content of the deposits has made extraction expensive, but Atomic Energy Ltd. recently stated that they had evolved economic methods of extraction. This company has two plants for handling uranium ores. One, Central Sweden, produces a concentrate with a uranium content of about 10 per cent—compared with 0.02 to 0.03 per cent in the original shale. The second, in Stockholm, reprocesses the concentrate until pure uranium is obtained. Atomic Energy Ltd. estimate Sweden's uranium needs at 20 tons a year by 1960 and more than 200 tons by 1970.

Of the British Commonwealth countries, Australia's uranium production is only just getting under way and the present aim is 1,000 tons a year. South Africa has a large potential as a uranium producer, and after Canada ranks second at the present time with over 6,000 tons a year. South African producers are, of course, in the happy position that there are still the remainder of the various contract periods to run during which a premium price will be paid for the uranium.

Undoubtedly the refusal to set up Klerksdorp as a selected uranium producer has jolted the South African mining companies. Uranium is obtained in most cases in South Africa as a by-product of gold, although there are major uranium producers where gold is the by-product, or where a few years hence gold recovery will prove to be uneconomic. So now the South African uranium producers are giving thought to production costs.

Existing processes for uranium extraction in the Union were worked out and put into operation when the sole consideration was to obtain the optimum amount of uranium irrespective of cost or price. If the Union is to maintain its place as a major producer in the future new and cheaper methods of extraction must be found.

Also disturbing to South Africa has been the recent announcement that UK scientists have found a means of controlling the hydrogen atom reaction. Indeed, some investors holding gold-uranium shares have seen in this news the end of uranium as a nuclear fuel. However, despite this news, development of this source of power will take about 30 years or more before it can be an economic proposition.

It appears that there has been much talk in the Union regarding the building of a nuclear reactor to provide electric power in the Western Province. As has already been stated, uranium is the most economical fuel for such reactors and is likely to remain so for some time to come.

The major cost of a nuclear power station is the equipment required and the specialised construction. The cost of atomic power has been estimated as being equivalent to using coal at 70s a ton, but in the Cape the cost of power would have to be equivalent to 40s. Nuclear power would not be economic therefore until its costs had dropped below this latter figure.

Across the Atlantic, Canada has considered that with the development of atomic power in Britain, Europe and the US there should be a significant growth in her uranium industry. Canada's production of uranium concentrates will soon top the 15,000 tons a year mark. However, Canada must also be considering the uranium position carefully, particularly having regard to recent reports of the uranium industry in the US.

Growth of the US uranium industry was, until September last, shrouded in secrecy by the Atomic Energy Commission. Now developments for the first half of this year are known. Total capacity of some dozen uranium mills in operation in the US is 9,210 tons a day of ore. Next year, total ore capacity will nearly double—to 18,305 tons a day when new mills will be in operation. Uranium concentrates received at the AEC's depot during the first six months of this year totalled 4,141 tons of uranium oxide compared with 6,000 tons produced in 1956. US uranium ore reserves are now estimated to be about 67 million tons (averaging 0.27 per cent uranium oxide) and total ore stockpiles in the western US at 30 June this year amounted to almost 195 million tons, 448,000 tons being held by private companies.

Opinions have been expressed that the US should be able to produce uranium at a price in the neighbourhood of $8 a pound. It is also generally agreed among technicians that the atomic reactor of the near future will have fuel costs of about one-tenth of a cent per kW hour.

A US uranium marketing authority has suggested the possibility of an oversupply of uranium, and the action of the Atomic Energy Board, which is a joint body of US, British and Canadian atomic interests, in regard to Klerksdorp would seem to emphasise this suggestion. Hitherto the board has taken all the uranium from the approved mines in South Africa on terms that involved a long contract, a loan to cover the cost of the recovery plant and a price calculated to amortise that loan during the life of the contract. Now it appears that Britain and the US are no longer to maintain a position as monopoly buyers of South Africa's uranium. Nevertheless, while uranium producers may seek loans elsewhere, sales to any buyer will not be allowed. Some suggest that the bulk of surplus output will have to be absorbed by a US power programme on a scale not at the moment envisaged to avoid oversupply.

All in all, this adds up to the beginning of a buyer's market in uranium.

TITANIUM PROJECTS SURVEY

IN Australia, the subsidiary of British Titan Products Co. Ltd., Australian Titan Products Co. Ltd., has a project in hand to raise the capacity of its pigment plant from 8,000 tons to 20,000 tons a year. Another subsidiary of a British titanium producer, Laporte Titanium Ltd., has also been reported as planning to establish a titanium oxide plant. However, the managing director of Laporte Chemicals (Aust.) Pty. Ltd., has very recently announced that the company has decided not to proceed with the establishment of a plant for the manufacture of titanium oxide in Australia under existing conditions.

Even with these new projects, however, the oversupply of rutile has resulted in a critical position for the beach sands industry in Australia. Hitherto rutile has been the preferred new material for pigments owing to its high content of titanium dioxide. Now, however, production capacity of the more prolific ilmenite is shortly to rise to 300,000 tons a year in Australia and is also becoming available in increasing quantities in other countries.

As has already been reported Western Titanium NL, Capel, W. Australia, largest producer of ilmenite concentrates, is raising its capacity of 72,000 tons of concentrates to 100,000 tons annually. Also increasing capacity are Cable (1956) Ltd., operating at Koombana Bay, Bunbury, who plan to produce 90,000 tons annually of concentrates, and Western Oil Ltd., who plan to erect a plant south-east of Capel, having an annual capacity of 100,000 tons.

In Spain, the principal titanium dioxide producer, Union Quimica del Norte Espanola SA, expect titanium production to total 7,300 tons this year. Ilmenite, used as the raw material for its titanium pigments such as the tetrachloride and butyl titanate, is obtained from the companies local mines at Axpe-Bibao. Unquinesa, who began titanium production in 1952, have annually increased their production of titanium dioxide. The only other Spanish producer, Chromogenia y Quimica Curtiente SA, whose output in 1955 totalled 300 tons, is considered likely to find it difficult to maintain its exports which last year reached 400 tons.

In Japan, titanium dioxide capacity is to be expanded by Ishihara Sangyo Kaisha Ltd., a leading manufacturer of titanium dioxide in the Far East. Recent additions to their Tokkaichi plant, at Mie Prefecture, have doubled capacity to 24,000 tons a year. Raw materials treated at the plant are rutile and anastase for which parallel circuits are provided.

It will be recalled that in recent months with US defence stockpiling of titanium metal being reduced, US producers have been concerned about overproduction of the metal. Thus the president of P. R. Mallory and Co., a US company producing titanium metal, recently told a financial meeting that today's titanium metals business is 'terrible'. He said that his company would be lucky to break even in its titanium activities in 1958 and 1959, although an improvement in 1960 was expected. In the meantime, the company is making efforts to develop commercial outlets. It believes such markets are small, but that there are 'a lot of them'.

Only a few weeks ago, the major UK titanium producer, Imperial Chemical Industries Ltd. (see CHEMICAL AGE, 19 October, p. 648) rejected US reports that titanium was proving a 'flop'. Undoubtedly the future of titanium will be in development of commercial outlets for it, but for some while, more research and development will be required, together with further expenditure, before worthwhile profits will be obtained.

It is perhaps worthy of note that competition will be marked from the US and presumably also from Japan, for that country now has surplus titanium as a result of US needs diminishing.

NEW DEVELOPMENTS IN FERTILISER GRANULATION

Techniques Described by Mr. A. T. Brook

NEW developments in compound fertiliser granulation, including use of steam instead of water, were discussed by Mr. A. T. Brook, Fisons Ltd., in his paper read this week in London to the Fertiliser Society.

Problems of granulation have been complicated by the farming demand in recent years for more concentrated compounds, which has involved large increases in the soluble-salts/superphosphate ratios of formulations. The rising incidence of this variable factor, added to plant-operation variables such as the granulation drum's speed of rotation, its slope, water-spray number and siting, etc., called for experimental studies in which conditions could be selectively controlled. A small batch-operating pilot-scale granulator was therefore built.

Much of the development work described by Mr. Brook has stemmed initially from this small plant, whose drum is only one foot in diameter and length and whose measurable water-supply is fed from a wash-bottle. Indications given by batch production on this plant have subsequently been put to test on full-scale granulating plants at Fisons' factories.

Granulation Efficiency

Mr. Brook put forward a definition of 'granulation efficiency' as the percentage of material within the required size range measured immediately ex drier. A high figure for this is required, provided its attainment is accompanied by good controllability and stability. The following factors of high influence were shown up by pilot-scale studies:

(1) sensitivity of certain formulations to the water/solids ratio;

(2) the different water requirements of fresh raw materials and recycled fines, the water requirement of the latter being found—unexpectedly—to be *lower*;

(3) the importance of correct rolling in the drum;

(4) the extent to which granule growth and granule shape developed in the drier;

(5) the effect of crystal size of sulphate of ammonia.

Sensitivity to Water/Solids Ratio. Requirements for dealing with sensitivity problems of mixtures were summarised in the form of these specifications for plant-operation. Operators controlling the water-feed should resist the tendency to over-correct. The flow of material (solids) at the wetting stage must be kept uniform otherwise it is useless to ensure a constant flow of water; positive means for ensuring a constant solids flow-rate, such as the provision of feed scrolls, are desirable. Progressive build-up of fertiliser inside the granulating drum should be avoided, e.g. by effective external hammering. All these means of control are assisted by high rotation speeds for the drum.

Recycled Fines. No present process of granulation can give 100 per cent of product within required size range, and fines must be re-circulated. This has a two-fold effect—reducing slightly the amount of water needed for granulation, and providing coarser particles in the raw feed, thus promoting better rolling. The effect of fines can be controlled by returning them through a hopper fitted with extractor-belt and gate-control, and the hopper should have a capacity not less than one-third of the plant's hourly capacity.

Plant tests showed that the flow-rate of fines from the screens could vary by 20–30 per cent over periods as short as 30 minutes; these variations could, however, be minimised by more attention to their main causes: (1) over-correction of water feed, (2) variation in feed nature often due to the fines, and (3) fines-screen cleaning. Minimising (2) eliminates (3) and reduces the incidence of (1).

Correct Rolling. The correct speed of rotation brings about a cascading motion in addition to the rolling motion, and this dual movement pattern helps to bring about uniform water distribution plus sufficient shearing action to break down oversize particles when they are formed. Higher rotation speeds than those formerly thought adequate are called for. In one large-scale test an increase from 7 to 9 r.p.m. halved the proportion of fines recycle and gave more rounded granules. High speed has mechanical problems, but at Fisons' latest plant speed has been increased from 9 to 12 r.p.m. and previously-used granulation aids could be dispensed with. Speed increases to 15 r.p.m. are aimed at.

Granule Growth in Driers. Progress indicated by pilot-scale work has been difficult to apply in large-scale production. Driers are large and their rotation speed is too low to produce the required rolling motion; the usual inclusion of lifting and dropping flights also stops rolling motion. Granule quality was improved by introducing a clear section at inlet ends of driers, allowing material to roll at high temperature before being picked up by lifters. Ideally, a separate pre-drying rolling unit is needed, which could at high speed rotation give granules sufficient hardness to withstand normal drier handling without deterioration.

Sulphate of Ammonia Particle Size. Needle-shaped crystals interfere with the mixture's rolling characteristics; a length/breadth ratio not above about 1.5 is desirable, and this is usually more associated with the stubbier crystal shape of synthetic sulphate of ammonia.

Steam Granulation. Mr. Brook then discussed the development of steam for granulation in the place of cold water. Though much of the preceding work still applied, the use of steam had modified some of its control requirements. The use of steam is associated with the requirement of 'high-drying', i.e. to about 1 per cent moisture-content in final granules (a necessity for good storage properties in many high NPK-content mixtures). High-drying with cold water granulation imposes a heavier load upon driers, with resultant drops in hourly output. Overall fuel needs are not much different; nor, for new plant construction, would the costs of a larger drier and furnace be much different from the costs of the normal-sized drier plus a steam-supplying installation.

Steam granulation was claimed to have these extra merits. It gave improved quality of product, with less recirculation load. It reduced bagging costs through the higher bulk density of the final product. *It enabled certain mixtures with high salts/superphosphate ratios to be granulated when, by the cold water method, their granulation would be almost impossible.*

The moisture content of material entering the drier is reduced by about 3 per cent. A major operational requirement in steam granulation is ducted ventilation to remove evaporated moisture from the rolling, steam-fed material; the granulator in effect has become a primary dryer.

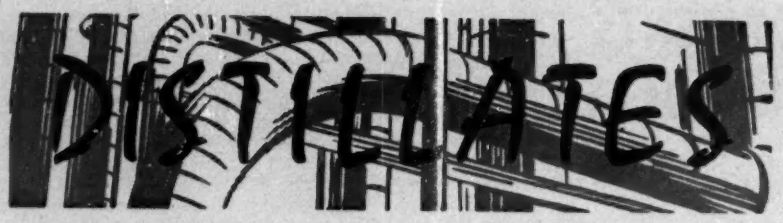
It was indicated that steam granulation has now been generally adopted by Fisons Ltd., mainly since production was started of their '30' range compounds in which, through inclusion of triple superphosphate, the reduced proportion of ordinary superphosphate brought problems of water-control sensitivity.

ABCM Members Vote in Favour of Free Trade, if . . .

A recent referendum of members of the Association of British Chemical Manufacturers indicated a majority in favour of the Government policy on the West European free trade area, on the assumption that the conditions and safeguards outlined in the recent 'joint report' either form part of the free trade area convention or are otherwise assured. The 'joint report' referred to was that published in September by the Federation of British Industries, National Union of Manufacturers and the Association of British Chambers of Commerce.

ABCM states that safeguards of special importance to the chemical industry are that a value criterion is essential as an alternative to any process criteria in determining the origin of goods and that there is need to strengthen the Customs Duties (Dumping and Subsidies) Act so as to provide speedy means of dealing with short term dumping. Attention is drawn to the artificial barriers to trade which exist as a result of official regulations governing the registration of pharmaceutical and food additive products and to the need to obtain visas before import.

Patents and trade marks are of special interest to the chemical industry, which urges that speedy consideration of compulsory licencing requirements be undertaken and that anomalies in the application of trade mark law in West Europe should be removed if trade is not to be hampered or frustrated.



★ 'I COULD have cried,' said Mr. Eric Wain of the Canadian Trade Mission, to me in London last week. 'My company needed a heavy mixer; a US manufacturer quoted $56,000 and a British manufacturer $38,000 for a machine just as good. But we had to take the US order. Why? The Americans could deliver in June, the British manufacturer wanted until October. We just could not afford to wait.'

Mr. Wain, who was born in Bradford, is general purchasing agent for Canadian Industries Ltd., Montreal, a subsidiary of ICI.

He also stressed the need for exporters to make sure that their products were suitable for the Canadian market. 'Often,' he said, 'what may be useful for 90 per cent of customers is no good in Canada. We must get exactly what we ask for. If these two conditions are fulfilled, the market is wide open.' British manufacturers with an eye on Canada would do well to ponder on Mr. Wain's remarks.

The 57-man mission, largest ever to leave Canada, is headed by Mr. Gordon Churchill, Minister of Trade and Commerce. Their object is to fulfil Mr. Diefenbaker's intention to divert 15 per cent of Canadian purchases from the US to other suppliers, particularly Britain. Among their engagements are visits to British Nylon Spinners, Pontypool, British Hydrocarbon Chemicals, Grangemouth, and Courtaulds' Northern Ireland plant.

★ A FIRE which the Nelson and Colne fire brigade did not dare to put out, occurred at the Valley Mill of Lustrafil Ltd., rayon spinners, Nelson, on 21 November. It seems that carbon disulphide from a tank touched a steam pipe and caused a small explosion. The chemical on the outside wall of the building and on the ground was set alight. The firemen dared not attempt to put out the flames because to do so would have caused a more pungent vapour and this would have created the greater danger of explosion. The fire was therefore left to burn within strict limits. Care was taken to prevent it spreading and to ventilate the building to get rid of vapour as quickly as possible.

★ THE Rivers Department of Manchester Corporation have continued their development work on various systems of biological purification of sewage. (The new Beckton pilot plant was referred to in CHEMICAL AGE, 12 October, p. 593.) The department's annual report states that because of claims made by Dr. Pasveer in Holland that aeration by means of a brush covered by a hood and operating in a shallow tank could effect a much higher rate of purification of sewage than before, arrangements were made to alter the Kessener aeration tank to a shallow aeration unit and to fix a cover over the brush.

It is stated that it is a simple matter to maintain a very high concentration of activated sludge in good condition in this process, but the early indications were that it was not quite possible to obtain from the complex Manchester sewage an effluent of the required quality without an aeration period of about two hours.

★ THE value of suggestion schemes has often been questioned. Investigation would probably show that a high proportion of those that have been dropped suffered from lack of planning. According to the Australian Department of Labour one of the most successful schemes carried out in that country is organised by Monsanto Chemicals (Australia) Ltd.

The Monsanto scheme is run by a suggestions committee and successful ideas are posted on a board. Awards paid ranged from 10s 6d to £165 15s. The average figure is £7 7s. From 700 suggestions submitted between July 1953 and October 1955, 208 were accepted for use. There was a continuing rise in the rate of suggestions submitted from 17 a month in the first six months to 31 a month in the last six months.

A major element in the success of the scheme was the general pattern of co-operation and consultation between management and employers. Another essential ingredient was detailed planning. Without these, there can be little hope for an effective scheme.

★ THE launching of the Soviet earth satellites, a tremendous achievement, has, if nothing else, served to waken the western world from its lethargic approach to science and technology. Many fine words have been spoken in recent years by politicians on the need to encourage the advancement of science; of action, there has been all too little and in those places where Governments have been active, much of the effort has been dissipated by duplication.

This has been particularly so in the US where rivalry among the three services has been deliberately fostered; scientists will hope that Mr. Killian in his new appointment will be able to eliminate much of this waste and strengthen the development of basic research and technology, on which the US is already spending $400 million a year.

Western Europe was urged to improve its research facilities, particularly for its outstanding scientific leaders, by Sir John Cockcroft, director of the AEA, when he spoke at the Amsterdam congress of the European Cultural Foundation on 23 November. He called for more funds for fellowships to be held in Europe and spoke of a need to raise the salary levels of younger scientists. He also pointed out that young scientists were attracted more by good facilities and imaginative leadership than by salary levels, although they were not unimportant.

Sir John added that the Russians could concentrate an enormous effort to science and technology because they now had under training 50,000 scientists and 60,000 engineers a year.

★ WITH the apt title of Nuclear Enterprises, a Scottish firm has proved the US pundits completely wrong by being first in the field with a contract for the production of the first multi-channel industrial tracer scintillation spectrometer to be made in Europe. Called the Scintillometer, the instrument has been used in uranium and oil prospecting and since 1949 in nuclear physics laboratories.

Writing in the journal *Nucleonics* of September 1957, an eminent US scientist stated 'these applications contain the seeds of a new industrial revolution' and he envisaged the use of such processes 'within the next 10 years'. Nuclear Enterprise were established a year ago at Bankhead Medway, Sighthill, Edinburgh 11, under the leadership of Dr. Robert W. Pringle, a native of Edinburgh.

The new industrial version, designed at Sighthill, is to be supplied to the Ekono organisation in Helsinki and is the forerunner of many such units to be used in Scandinavia. Described in p. 886, this instrument is now being sought by industries in the smaller countries as a short cut to processing economies. An advantage of the technique is that employment of highly sensitive plastic phosphors permits the effective use in counting of short lived isotopes in small quantities.

★ THE idea that Captain R. H. Pilkington (Cons., Poole) might be a secret mass poisoner, 'probably in the pay of the ICI,' caused laughter in the House of Commons at question time on Tuesday. Captain Pilkington, who had asked the Minister of Health if there had been any general acceptance of the experiments with fluoride in drinking water, added that when he last raised the matter, he had received a postcard accusing him of being a poisoner!

Replying to the question, the Minister, Mr. Derek Walker-Smith, said the experiments were more in the nature of demonstrations of studies, which were serving a very useful purpose. He told Dr. Edith Summerskill (Lab., Warrington) that the four studies were continuing under the supervision of technical officers of the Ministry of Housing.

The general trend of their information was not dissimilar to that from experimental work previously carried out in the US, from which it appeared that the fluoridation of water could reduce dental caries by up to 60 per cent.

Alembic

USERS CRITICISE CHEMICAL INDUSTRY'S PACKAGING

Demand for Gussetted Paper Sacks

BULK containers and tankers for the transport of chemicals were being increasingly thought of simply because the packages used by the manufacturers did not help the user sufficiently and because many of them increased labour costs in the user's factories. This was stated by Mr. J. C. McNichol, Dunlop Rubber Co. Ltd., in the first of a number of talks on the packaging of industrial chemicals arranged by the West Midlands branch, Institute of Packaging.

Mr. McNichol was one of two speakers to give the user's viewpoint, the other being branch chairman Mr. L. S. Eldershaw, Bakelite Ltd. Following the meeting, a party of about 40 members visited the Birmingham factories of Dunlop and Bakelite. The chemical manufacturer's viewpoint is to be given at a meeting early in the New Year.

Mr. McNichol said that the 'sales appeal' of an industrial chemical pack was the measure of its fitness for the customer's needs. The tendency in the Dunlop factories was to take more liquids in bulk tankers, but where drums were used there was much to be done towards standardisation of style, size and shape and closure to make them suitable for modern mechanical handling equipment.

98 Per Cent in Sacks

Most of the dry chemicals used by Dunlop were in powder or pellet form, with a few supplied in flake. Of 500 tons used weekly in the Birmingham factory, some 410 tons were packaged and of those 98 per cent arrived in paper sacks, the other 2 per cent being packed in loose liners in wooden kegs. While a paper sack was a good container for dry chemicals, there were a number of objections to its use.

Most of the sacks, when filled had one thin flat end and a fat round one and therefore did not stack well either on the ground or on pallets. Again, many chemicals were packed in two unimaginative weighs of ¼ and 1 cwt., irrespective of the density of the chemical in relation to its volume, resulting in either large unwieldy sacks or floppy packages when the density was low.

Bearing in mind that an individual package might be handled up to a dozen times before its contents were used, and as anything over 70 lb. weight might require two men to handle it every time, handling became an expensive problem. Sacks were also wasteful with powdered chemicals because of dispersion into the atmosphere when the sack was shaken out. Also a small amount was always trapped in the sack, which amounted to a large quantity of raw material lost every year. Finally, the sacks had to be disposed of, requiring sorting and baling, or burning.

Only a few dry chemicals were received in drums or kegs, which were used today in the UK only when it was essential to maintain the molecular make-up of a chemical by protecting it completely from physical damage.

Although more dry chemicals would probably be taken in bulk containers there would always be room for some packages. Moreover, if a cheap unit pack could be evolved, correctly weighed for each factory mix and if the package could be then thrown into the mixer without use of expensive check weighing mechanism, then some of the very expensive bulk handling projects would be thwarted. As those packs would generally be handled on pallets or by fork-lift trucks, they should be sized to fit British Standard pallets. In short, the weight of each chemical packaged should be determined so as to produce the correctly dimensioned pack and not to enclose an arbitrary weight of 56 or 112 lb.

Mr. McNichol suggested that the permitted weight range should vary between 40 and 70 lb. with steps of 10 lb. between the limits. In the case of paper sacks, length and breadth could remain standard with perhaps three different depths of gusset. To overcome the dispersion and dust menace when sacks were opened, it should be possible to provide loose plastics liners inside the sacks which could be fed into the mixer, guarding against dust fall-out when they were burst open by the mixing paddles.

He ended with the warning that if satisfactory packages were not found, then industrial chemicals would inevitably be handled in bulk tankers or containers.

Standardised Drums

GREAT need for standardised containers, particularly of metal drums, was referred to by Mr. Eldershaw. His company, Bakelite, received at least six different sizes of 40/50 gal. drums, making palletisation very difficult and creating serious and unnecessary problems in their re-use for export, where documentation of every different size drum was needlessly multiplied. As these containers were re-usable and were sometimes purchased reconditioned it was almost impossible without standardisation for the user to get beyond a collection of oddments. The same lack of a common size applied to 5 and 10 gal. drums, together with an ever widening variety of closures.

Mr. Eldershaw agreed with Mr. McNichol's remarks on paper sacks and stressed the need for a standard size for a standard weight, with an effective method of closure that could be used on all sacks. The use of unlined hessian sacks in the industry was limited as the contents were liable to contamination by dirt and dust through the mesh of the sack, while loss through seepage and infiltration of loose hessian fibres and other foreign bodies into the mix were other disadvantages.

He criticised the unproductive work connected with disposal of sacks and said it was more than ever necessary for packaging manufacturers to produce more non-returnable containers, particularly in view of the railways' proposal to do away with the 'returned empties charge agreement'.

There must be a big field for development of fibreboard kegs and containers to replace wooden packing cases. A fibreboard outer from 48 in. by 48 in. to 50 in. by 102 in. would find a ready market if the cost allowed its use as a 'non-returnable', particularly bearing in mind the higher cost of cleaning and reconditioning metal drums and the increased carriage costs.

As Bakelite received chemicals in 40 different types of package, it was clearly high time that the manufacturers and users joined hands with the packaging industry to work out convenient and standard packages for most of their products.

Most of the many questions that followed these two papers dealt with the theme of standardisation. One suggestion that a thinner gauge tinplate might be used for the larger metal drums to render them non-returnable, was thought impractical.

A representative of a large chemical manufacturing company said there had recently been a distinct movement towards standardisation among some drum manufacturers of the 40/45 gal. container with a diameter of 22½ in. This move followed the demands of the major oil companies for a standard drum. It was the duty of a company's buying department to insist on getting the drum size required and not merely to take anything that was available.

After a prolonged discussion with members from paper sack firms on the workable dimensions of paper sacks, it was generally agreed that the sack maker could and would produce whatever size was called for by the chemical manufacturer.

Many harsh words were said of the glass carboy and some members looked on its replacement as an urgent necessity. The plastics industry should, it was stated, produce an alternative. Rigid polythene liners were already being developed and polythene bottles inside wooden crates would be used more as prices came down with growing experience in production and decreased raw material costs.

Concluding the meeting, Mr. Eldershaw, as branch chairman, pointed the moral that co-ordination between manufacturer, user and package supplier was increasingly important with all the developments under way using new packaging media.

Visits to Plants

CONTINUING their enquiry into the packaging of industrial chemicals 40 members, including some from South Wales and the East Midlands spent an afternoon visiting the Birmingham factories of Dunlop and Bakelite. After lunch at Dunlop Rubber, the party saw the problems connected with handling and using many and varied types of chemicals. The tour included a visit to the raw material stores where packaged chemicals are used and here and elsewhere, emphasis which Mr. McNichol had given to the needs for containers to fit BS pallets was readily appreciated. Members saw the extensive use to which palletisation was being put.

The visit to Bakelite confirmed the

impression already formed that standardisation both by weight and container was sadly lacking. After tea at Bakelite Ltd., a discussion session was opened by Mr. Eldershaw who recapitulated the points he had made in his talk.

Commenting on the statement that paper sack manufacturers were not meeting their customers' requirements, Mr. E. C. A. Roberts (Bowaters) said, 'Most requirements are available and in fact any size can be made provided there is a sufficiently large run for a relatively small extra outlay. Steel drums can also be obtained to the manufacturers' requirements.'

Mr. McNichol: 'This may be so, but Dunlop are only one customer of many and sack makers could campaign for standard tailored packages to please most, if not all, manufacturers. Present sacks may have been suitable for stacking, but they are no good for palletisation'.

The fault lay with the chemical manufacturers for not asking originally for what their own customers (i.e. the users) wanted, said Mr. Eldershaw. If they could get together with the user and the packaging manufacturer, then it should be possible to standardise on 4-6 sizes of sacks suitable for palletisation.

Mr. McNichol wanted to know why gusseted bags were not available to take different densities; when filled they could be of a standard size.

There appeared to be no reason why they were not available, except that no one had asked for them, replied Mr. Roberts. If they were wanted in sufficient quantities, they would become a standard and therefore cheaper.

Mr. Marsh (Dunlop) said his company lost something like 3,000 lb. of powder each week in one factory alone through burst sacks which were not tailored to their pallets.

Mr. Eldershaw said that manufacturers would be represented at the next branch meeting and they would receive a resumé of the first two meetings. He added that the Association of British Chemical Manufacturers had recently set up a packaging committee to study these problems.

Asked if there was such a thing as a standard pallet, Mr. McNichol said there was. They varied from 32 in. by 40 in. to 40 in. by 60 in. If 24 in. by 16 in. packs were produced, they would stack without overlapping or overhanging. A pallet of up to 40 in. by 40 in. would be accepted by British Railways.

Mr. R. F. Naish (Albright and Wilson) said his company bought 800,000 sacks a year, all to their own specification and needs.

ICI's New Isocyanates Plant

A NEW plant for making organic isocyanates has been brought into production at the Huddersfield factory of ICI's dyestuffs division. The company has now added to its range of Suprasec organic isocyanates four new brands, Suprasecs SF, D, AC, and F. These products supplement and to some extent replace Suprasecs C and DX which have been marketed by ICI for the last few years.

The curing agents are supplied and used in conjunction with various polymeric reagents to produce flexible forms, rigid forms, soft and hard rubbers, lacquers, electrical insulating compositions and adhesives. Suprasec SF (tolylene diisocyanate) is used in conjunction with Daltocel SF, a polyester compound, to produce polyurethane foams that can be cut into sheets or otherwise shaped and bonded. These foams have a very good load-bearing capacity, great durability, ease of working and they are virtually non-flammable. They may be used for thermal insulation, protective packaging, air filters, sound insulations, and for a wide range of consumer applications.

Rigid foams used mainly for thermal insulations can be produced from Suprasec D and Daltolac 21. With the same chemical and physical characteristics as flexible foams they can be made in situ and used where their firm adherence to metal or other surface makes them an integral part of the assembly. The main applications of Daltolacs 9, 10, and 11 used in conjunction with Suprasecs AC, C, DX, and F is for surface coatings which are resistant to solvents, oils, chemicals and ageing. Wire enamels, lacquers for metals and varnishes for wood, concrete and other materials can be made from these polyurethane coatings.

Investigations into isocyanates dates back to the early part of the war. Although parallel investigations were going on in the US and in Germany, ICI's 'Vulcaprene' A was the only product to be produced commercially. It was made available to industry in general in 1946.

John Crampton Open New Laboratory

Watching the pipetting of iodine at the opening on 21 November of the £20,000 laboratory and test kitchen of John Crampton Ltd., Wythenshawe, Manchester are, left, Mr. D. K. Moore, production manager and Mr. W. A. Innes, chairman of the Cerebos Group

Chemical Industry Associations Prepare for Little Europe

Recently, the Council of the Italian Chemical Industry Association (*Associazione Nazionale dell'Industria Chimica* or *Aschimici* for short) met to discuss the problems involved in the imminent application of the Treaty of the European Economic Community.

Italian chemical industry is particularly concerned with the creation of the Common European Market and of the Free Trade Area.

To deal with the new situation better, chemical industry associations of the six countries belonging to the Common European Market have already agreed to institute a sort of joint liaison committee. This step is to be ratified officially very soon and the new committee will act as a co-ordinator of chemical industries of 'little' Europe.

The duties of the new institution will include posting the Associations-Members on requirements in raw and semi-processed materials, productive potentials, customs tariffs, regulations concerning exports and imports, taxations, etc.

Price Index Numbers

PRICE index numbers for commodities and groups of commodities up to October 1957 have been published. Figures are as follows:

(a) Price index numbers for commodities and groups of commodities produced in the UK:

TABLE 1

Material	Oct. 1956	Oct. 1957
Dyes and dyestuffs	143.6	143.2
Disinfectants	126.5	126.5
Insecticides, weedkillers and fungicides	135.5	126.9
Synthetic resins and plastic materials	123.5	121.2
General chemicals	157.5	164.2 *
Benzole, pure, B.S.S. 136–1950 ...	182.9	191.4
Caustic soda liquor, 100°Tw ...	157.6	168.6
Soda ash, light (delivered) ...	164.5	174.5
Soda ash, light, f.o.r. works ...	173.4	185.7
Sulphuric acid, B.O.V.	173.7	177.2
Sulphuric acid, R.O.V. 94/95 per cent	181.8	190.8
Drugs and pharmaceutical preparations	102.4	106.6 *
Synthetic detergents	115.4	121.1 *

(b) Price index numbers of commodities and groups of commodities wholly or partly imported into the UK:

TABLE 2

Material	Oct. 1956	Oct. 1957
Fertilisers	196.1	197.6
Oils, resins and gums		
Linseed oil, crude, spot, London, bulk, ex-tank	80.6	71.9 *
Palm oil, c.i.f., in bulk ...	87.5	76.9
Whale oil, acid, soft, naked, ex-works	112.1	106.9
Shellac, F.O., T.N., pure, ex-wharf	99.3	65.9
Pyrites, c.i.f., UK ports	176.9	161.8
Rubber, No. 1 RSS, one month future	268.6	248.6
Sulphur, crude (for acid making), c.i.f.	176.6	154.2

*Provisional figure.

Chemical Exports 3 per cent Down

Exports of chemicals in October were 3 per cent below the January-September average, reports the 22 November *Board of Trade Journal*. This figure is the same as the average for all manufactures.

In the same month imports of chemicals were one eighth higher than the January-September average.

USES OF NITROGEN IN US COVERED BY OEEC SURVEY

US Marketing Services Praised

WORLD production of nitrogen at the present time has shown a tendency to rise faster than consumption. Producers have therefore been looking for new outlets. The problem is particularly acute in the OEEC countries, which are traditional exporters of nitrogen. Now, however, many of the countries which used to import are now installing their own plants.

As the proportion of nitrogen consumed in the chemical industry is higher in the US than in Europe, the chemical products committee of the OEEC recommended a study of the possibilities of increasing uses of nitrogen in the chemical industry as based on studies of the situation in the US. The report of the OEEC mission, headed by Andre R. Macq (chairman), of the engineering department, Union Chimique Belge, Brussels, Belgium, which visited the US at the end of last year, has now been published. (E.P.A. Project No. 371, 'Industrial uses of nitrogen in the United States'. Price 13s, obtainable from OEEC, 33 Rue de Franqueville, Paris 16e, France.) Part I sums up the situation in that country and certain of the European countries (Belgium, France, Sweden) as regards production, marketing and consumption of nitrogen both as a fertiliser and in the chemical industry. Part II gives a detailed description of the characteristics and possible uses of a large number of nitrogen products.

It will be noted from figures of consumption of nitrogenous fertiliser and of nitrogen per head of the population as well as the ratio of industrial to total nitrogen (Table A), that although European countries lag behind the US in the ratio of industrial to total nitrogen, this is not merely due to the higher consumption in Europe of nitrogenous fertiliser. It is apparent that the Belgians and the French consume less technical nitrogen than their national income would enable them to do if they were in the US. Sweden consumes much the same quantity as the US.

Principle outlets for technical nitrogen by country were found to be as in Table B. By comparing these figures with those in the following table which shows total production in the industries concerned (according to OEEC sources) it is noted that France, which produces about 10 times less industrial explosives than the US, nevertheless uses 20 times less nitrogen in so doing. Metallurgical output in Belgium of about one-eighteenth the total for the US takes 140 times less nitrogen (Table C).

Ammonia: Present US capacity is approximately 4.5 million tons in 52 works with an average capacity of slightly over 200 tons a day. The largest is Hopewell (1,000 tons a day). The 1956 production was 3.05 million tons. The markets for ammonia were: agriculture (about 2.3 million tons ammonia a year) 76 per cent; industry (about 750,000 tons of ammonia, or 600,000 tons of nitrogen) 24 per cent, which was distributed thus:

	Tons N.	Per Cent
Chemical products	175,000	7
Industrial explosives	125,000	5
Synthetic fibres	75,000	3
Resins and plastics	75,000	3
Paper pulp	37,500	1.5
Metallurgy	25,000	1
Oil	25,000	1
Miscellaneous	63,000	2.5

Nitric acid: The mission found it difficult to form an idea of the total output of nitric acid in the US as about 90 per cent is absorbed internally. Production in 1955/56 is estimated at about 2,150,000 tons, representing 480,000 tons of nitrogen devoted to the following uses: Solid fertilisers, 48 per cent; nitrogenous solutions, 27 per cent; explosives, 10 per cent; external sales by producers, 10 per cent; miscellaneous uses, 5 per cent.

Ammonium nitrate: In 1956 estimated production was 2,050,000 tons (720,000 tons N.) including 370,000 tons for explosives or approximately 120,000 tons N. These last figures the mission suggests are too low in view of the possible use of fertiliser grade ammonium nitrate for making cheap explosives, particularly by the Maumee Collieries process.

Urea: Production capacity is put at 450,000 to 500,000 tons. Principle uses are in fertilisers, 200,000 tons (50 per cent solid and 50 per cent liquid); industry, 80,000 tons (including plastics, 70,000 tons); animal feeding, 70,000 tons; and miscellaneous, 10,000 tons.

It is believed by US authorities that the present demand of 70,000 tons of urea for animal feeding is likely to rise to 100,000 tons a year during the next three years. Saturation point is likely to be 300,000 tons a year.

Cyanamides, melamine and cyanuric derivatives: No estimate was given for calcium cyanamide. It is produced by one manufacturer only and in the greatest secrecy. The mission suggest that this chemical may no longer be manufactured in the US but is imported from Canada (140,000 tons in 1947, 61,000 tons in 1951, 75,000 tons in 1955).

Production of sodium cyanamide is being planned on a small scale as there are only some industrial outlets. For making melamine-formaldehyde (45,000 tons of resins) 25,000 tons of melamine were used in 1955. No details are available for dicyandiamide, guanidine and its hydrochloride, and cyanuryl chloride. American Cyanamid Co. is engaged on research into cyanuric acid which may be used as a selective weedkiller and for making resins and dyes.

Aliphatic amines: The 1955 output of amines, according to the US Tariff Commission, totalled 83,000 tons, and that of ethanolamines at 36,000 tons. Methylamines form the largest group of alkylamines (10,000 in 1955 and 13,000 in 1956) with hexamethylene tetramine as the next largest group (9,000 to 10,000 tons in 1955) the remainder being made up of propylbutylamines, heavy alkylamines, polythenepolyamines etc.

Nineteen fifty-six production of the three methylamines was 10,000 to 13,500 tons: monomethylamine is mostly used for the manufacture of detergents (63 per cent); dimethylamine is mainly used (38 per cent) for solvent for the textile, as a weedkiller (32 per cent), in agricultural products and

TABLE A. Nitrogen Consumption in Industry and Fertilisers

	US	Belgium	R.	France	R.	Sweden	R.
Industrial nitrogen							
Total tons	600,000	5,000	1/120	45,000	1/13.33	14,000	1/43
Per capita (kg.)	3.64	0.55	1/6.8	1.0	1/3.75	1.94	1/2
Nitrogenous fertilisers							
Total tons	1,900,000	90,000	1/21	400,000	1/4.75	83,000	1/23
Per capita (kg.)	11.5	9.9		8.8		11.5	
Per sq. km. (kg.)	244	2,700		710		180	
Total nitrogen							
Tons	2,500,000	95,000	1/26.3	445,000	1/5.6	97,000	1/25.8
Per capita (kg.)	15.15	10.45	1/45	9.8	1/1.55	13.44	1/1.13
Ratio							
Industrial nitrogen / Total nitrogen	24%	5.3%		10.1%		14.4%	
Population							
Millions	165	9.1	1/18	45	1/3.7	7.2	1/23

TABLE B. Nitrogen Consumption (in Metric Tons) Principal Nitrogen-Consuming Industries

	US	Belgium	R.	France	R.	Sweden	R.
Industrial explosives	125,000	1,575	1/79.3	6,000	1/20.8	3,600	1/34.7
Synthetic fibres	75,000	—		8,500	1/8.8	—	
Plastics resins	75,000	125	1/60	5,000	1/15	1,800	1/41.7
Paper	37,500	75	1/500	—	—	1,800	1/20.8
Metallurgy	25,000	175	1/143	3,000	1/8.33	900	1/27.8
Oil (refining)	25,000	25	1/1,000	250	1/100	—	—

TABLE C. 1955 Production in Principal Industries Consuming Nitrogen (Metric Tons)

	US	Belgium	R.	France	R.	Sweden	R.
Industrial explosives	322,000	3,314	1/97	32,500	1/10	—	—
Textile fibres	2,875,000	64,000	1/45	390,000	1/7.4	73,500	1/39
Including synthetic	250,000	—	—	12,000	1/20.8	—	—
Plastics resins	1,450,000	17,000	1/85	102,000	1/14	32,000	1/45
Wood pulp (total)[1]	25,400,000	100,000	1/1,254	680,000	1/37	3,900,000	1/6.5
Sulphate pulp	1,980,000	21,000	1/94	127,000	1/15.6	813,000	1/2.4
Metallurgy (high grade steel)	105m.	5.9m.	1/18	12.6m.	1/8.4	2.1m.	1/50
Oil refining	350m.	4.4m.	1/80	22.9m.	1/15.3	1.9m.	1/184

[1]For US 9/10 of the total figure US + Canada has been taken.

TABLE D **Distribution of Principal Uses of Acrylonitrile (estimated)**

Year	Production[tons]	Nitrile rubber	Synthetic fibres	Plastics	Miscellaneous
		Percentage			
1952	18,000	50	25	12.5	12.8
1956	55,000	16	60	5.5	12.5

for vulcanising accelerators (22 per cent) for the rubber industry.

No figures are available for the production of the three ethylamines. Principle uses are corrosion inhibitors and rubber additives.

Fatty amines are thought to have a future in the production of additives for diesel fuels and as detergent amines.

Of the amino-alcohols, 1956 production of ethanolamines was approximately 45,000 tons (about 114,000 N). The greatest demand for ethanolamines as a whole is for detergents.

Another aliphatic amine, morpholine has a wide range of uses from floor polishes to corrosion inhibitor compounds. Some 2,000 to 2,500 tons were produced in 1956.

Aniline and derivatives: Estimates suggest that production will reach 80,000 tons by 1960. In 1955, the US aniline market was: chemical products for rubber, 66 per cent; dyestuffs and intermediates, 17 per cent; pharmaceutical products (veterinary), 7 per cent; pharmaceutical products, 3.3 per cent; chemical products for photography, 1.7 per cent, miscellaneous, 5 per cent.

It is stated that about 80 per cent of the present production of 58,000 tons of nitrobenzenes is used for making aniline.

Hydrocyanic acid: Annual production is of the order of 100,000 tons. Uses for this nitrogen derivative are production of cyanide, acrylonitrile, methyl-methacrylates and nylon.

Acrylonitrile: US production capacity for this preparation was at the time of the visit 55,000 tons, practically all of which was stated to be used. Estimated distribution of the principal uses is shown in Table D.

Recent estimates for acrylonitrile for acrylic fibres quoted in the OEEC report are: 1955, 34,000 to 40,000 tons; 1956, 50,000 tons; 1960, 90,000 tons; and 1970, 150,000 tons.

The more recent process for making acrylonitrile, that of condensing hydrocyanic gas with acetylene, is stated to have the economic advantages of lower production costs, and better quality. The US source claims that the acetylene process has brought down the sale price of acrylonitrile from 85 cents to 62 cents a kilogram.

Synthetic fibres: Synthetic fibres account for 3 per cent of all the nitrogen produced in the US, i.e. about 75,000 tons in 1956. In the tyre industry in 1956, 34,000 tons of nylon were used and it is suggested that 45,000 to 50,000 tons will be required this year and 60,000 tons in 1958.

Synthetic Fibres (million lb.)

	1950	1954	1955	1960
Nylon	130	200	260–290	390
Dacron	—	15	50	160
Orlon	—	40	55	130
Acrilan	—	30	42	100
Dynel	—	6	42	100

Dyestuffs and pigments: The mission gained the impression that the dyestuffs market is 'stagnant at present'. Vat dyes containing the lowest nitrogen content were in demand. It is suggested that US nitrogen consumption for dyestuffs would probably decline, though this might be offset by the development of nitrogenous organic pigments (blue and green phthalocyanines). Total consumption of nitrogen for dyestuffs is recorded as 3,000 to 3,500 tons per year, plus about 1,000 tons a year for organic pigments.

Plastics materials: A recent estimate, according to the mission, gave the US consumption for this purpose in 1956 as 75,000 tons of nitrogen. Total output of ureas and melamines, urea-formaldehyde and melamine-formaldehyde for 1955 was 150,000 tons, including 105,000 tons with a urea base and 45,000 tons with a melamine base. Textiles as a whole absorbed nearly 22,000 tons of resins; the paper industry, 10,000 tons; adhesives, 55,000 to 60,000 tons; and moulding powders, about 40,000 tons.

Opinions varied widely on the present demand for polyisocyanates and polyurethanes. However, the consumption of nitrogen for isocyanates was expected to rise to 7,000 tons per year. Some people informed the mission that they expected the annual output of urethanes would be 50,000 tons by 1960.

Agricultural uses: Although the mission was mainly concerned with the industrial uses of nitrogen, for the sake of completeness, the report includes a rapid review of US agricultural nitrogen uses.

Nitrogenous fertilisers distribution in 1956:

Solid fertiliser	40 per cent (1 million tons N.)
Nitrogenous fertiliser	19 per cent (475,000 tons N.)
Anhydrous ammonia (or in solution)	17 per cent (425,000 tons N.)

The mission was informed that about 48 per cent (233,000 tons) of the total of 485,000 tons of nitric nitrogen were accounted for by solid fertilisers and 27 per cent (133,000) by nitrogenated solutions.

OEEC NITROGEN PRODUCERS NEED VIGOROUS MARKETING METHODS

THREE major characteristics of the US chemical industry were discovered during the mission's US talks, which largely account for US achievements: these relate to each of the three basic activities of the industry: research, manufacture and distribution of products.

One of the most striking features noted was the care devoted by US companies to the organisation of marketing services.

Special Studies I of the report indicates that marketing presents two main aspects: first, the organised drive or sales promotion to develop the product from laboratory to industrial commodity; second, that products are sold to technicians on the strength of their technical qualities and accounts for the new type of salesman, the salesman-technician.

It is indicated that simpler techniques in using explosives and progress in packaging have created an opening for an ordinary grade of ammonium nitrate for industrial explosives. Improvements in agricultural machinery have made possible the application of anhydrous ammonia as a fertiliser and the use of complex nitrogenous solutions. Animal husbandry studies have led to the use of 70 to 80,000 tone a year of urea at present in livestock feeding, with a possibility of up to 300,000 tons a year in future.

There is a large-scale consumption, of the nitrogenous chemicals in new jet or rocket fuels and as additives to lubricating oil or motor spirit (anti-knock and anti-sludge-forming agents). In 1955, of some 80,000 tons of rubber additives used, 35,000 tons were based on nitrogenous products. (Special Studies II.)

Ion-exchange resins provide an outlet for nitrogenous products, urea, amines and nitrites. The uranium industry alone is stated to require about 1,100 tons of nitrogen in the form of ammonia and ammonium nitrate for regeneration of these resins, while nitric acid is used in the treatment of uranium ore.

The most important economic factor—price—has benefited technical progress, the mission reports; research into new processes is the underlying cause of the lower costs in the US. Special Studies III reveals, in a study of comparative costs for the production of synthetic ammonia in the US and Europe, that on the basis of its energy content, the raw material used was at most a quarter of the Belgian or French price. With cost ex works varying from $35 to $45 and a selling price ranging between $72 and $80, ammonia is considered a good proposition in the US. This low cost raw material also enables nitrogen derivatives to be produced at lower cost.

To this must be added also the rate of productivity, the value of which is 10 times higher in the US than in the French chemical industry, where the labour force employed is only 3.5 times larger than in France. However, as wage rates are three to four times lower in France, the proportion of labour costs to total costs is very similar in the long run.

In their conclusions the mission state that there is a distinct difference between the level of industrial consumption of nitrogen in the US and in the OEEC countries of the mission, to the advantage of the former. The principal reasons for this are considered to be largely outside of the control of nitrogen producers.

Manufacturers of ammonia and other chemicals have no say in fixing the price of energy and other raw material prices. The disparity in the development of nitrogen-consuming industries is not controllable by nitrogen manufacturers.

The mission suggests that European industrialists can do more—and more quickly—to alter their own marketing and applied research methods. Those industrialists who are able to bring their applied research laboratories and sales service up to a state of maximum efficiency will have their reward.

More Output Without More Capital

Utilisation of Chemical Plant

A GOOD planning section was worth a lot of money to a company—but only if its plan was carried out efficiently. The major benefits of planning were lost unless it was backed up by a process control system. This was stated by Mr. J. W. Whitfield, division productivity manager, plastic division, ICI Ltd., when he spoke on 'Improving plant utilisation' at a meeting on the process (chemical) industry held by the North Hertfordshire Productivity Association at Hitchin recently.

Mr. Whitfield said he was going to deal with process equipment in the chemical industry engaged on batch or semi-continuous operation and in particular those processes which involved the use of a number of different pieces of equipment to complete the operation. There were, for example, many processes which demanded mixing followed maybe by liquid extraction then drying, sieving and perhaps blending, etc.

In consequence of the many variations of colour, grade and type imposed on the production department by the sales requirements, it was extremely unlikely that each and every part of the plant could be loaded evenly and at the design stage. A compromise arrangement was arrived at, based on some estimate of pattern of business. Thus one might have provided two mixers, three liquid extractors, one drier, five sieves or any combination of these numbers, which, if operated up to the calculated capacity, would cope with the estimated programme of orders.

Out of Balance

Unfortunately, all too rarely did the pattern of business coincide with the original estimate and this inevitably led to out-of-balance conditions on the plant sections, with a consequent loss of output. However, it was the job of planning sections to cope with this and to produce a plan which minimised very considerably the effects of changes in pattern of order.

A process control system should at a glance indicate precisely what was happening on all sections of the plant *at a given time* as well as what *had* happened 12, 24 or 36 hours ago. Thus it could be seen what had happened to forward loading based on the plan, also what was in fact happening at any moment to any particular part of the plan and what was perhaps more important, what was likely to happen over the next 12 hours or so. Equally, of course, the planning and production people could both visualise the effect of the urgent order which had to go into production at short notice, and it followed that promise dates could be set with a much greater degree of confidence.

A system, which his division had developed for one particular plant gave, said Mr. Whitfield, an hourly picture of plant operation with no more than two or three charts in the shift foreman's office and one young clerk per shift.

The plant concerned was one making moulding powder at quite a high annual rate and the equipment consisted of: three bunkers containing basic raw material; 30 boxes holding approximately one ton each used for conveying material from one part of the process to another; 17 units for mixing in the various ingredients; and five finishing units turning out the finished product.

Mr. Whitfield then outlined these units of plant on a schematic diagram. The sections of chart were divided horizontally in hourly intervals. This was rolled in quite long lengths which lasted for a week or more. In use they had visible about 36 hours with the current time located in the centre of the chart but it could be rolled one way or the other in order to look back at what had happened or forward to look at commitments.

Box Control

This chart was a simulation of the box control part of the system, which was simply a piece of card for each box and a number of positions in which to place it. On the plant there was a board with a number of slides but there were many proprietary systems which would be suitable.

To explain his system, Mr. Whitfield assumed that planned orders were available and that the plant was completely empty. The requirements were six mixing units, two running on one colour, the other four on four different colours. The production people would therefore load six boxes with raw material and transport them to the mixing units—say numbers one to six boxes and one to six mixing units and charge the units—then add the appropriate ingredients and start them up.

The control clerk on his first tour of the plant would gather that boxes one to six had been used, as it was likely that they had been left near the units or at least were not in their ready-to-use position. From the mixing unit record sheets kept on each unit he would see that numbers one to six mixing units were charged and running on such and such colours.

On his return to the control room he moves the appropriate indicators for the boxes and marks up against the mixing units the starting time, the order number being produced—which, of course, shows colour, type, etc.—and *the estimated completion time* by drawing a line against the appropriate time.

This 'estimated completion time' was most important and had to be one capable of achievement and, if necessary, had to allow for small deviations from normal.

By the next hour the clerk would note that some more of the plan had gone into operation and some more mixing units put on the line, or from direct observation that number one unit had stopped. From the record sheet he would perhaps see that an electrical failure occurred at such and such a time or if it was not recorded seek out the operator or supervisor and ascertain the details in order to record these on his chart in the appropriate code. This could be red shading which would indicate an unscheduled stoppage, etched in maybe by black lines to indicate mechanical trouble. He would, of course, complete the charting up to date for all equipment in use.

On his next tour he would ascertain the duration of the stoppage mentioned above and so bring his chart up to date.

Turning to the time when some of the first six mixing units should be 'ready to empty' as shown on the chart by the mark of 'estimated completion time'; his observation might reveal that in fact all completed on schedule and he would so mark them, also the time they were emptied and cleaning started or recharging started, if cleaning was not required. This 'ready to empty' time was obviously another control factor and was signalled on the chart in maybe green. Empty or cleaning would also be signalled in separate colours.

At this stage some more boxes would have been used to transport powder from the mixing units to the finishing units and so the box record had to be completed accordingly. It was likely also that one or more of the finishing units had come into use, so records, using maybe the same colour code as for the mixing unit, had to be made including, of course, the 'estimated completion time', so that any 'over run' would be immediately picked up.

It would be appreciated, said Mr. Whitfield, that there were many opportunities for lost time to occur which would be exceedingly difficult for the foreman to keep track of when all the equipment was in use.

Clear Picture

Using the system described above the foreman or plant manager, or for that matter, the planning people, could see at any time what each item of equipment should be doing and also what in fact the position really was. For example, one or more of the mixing units might be standing '*ready to empty*' or '*ready to charge*' for a period of time and the possibility of this delay being due to non-availability of boxes or finishing units could be immediately checked by reference to the appropriate charts. This check might reveal that some boxes had been awaiting cleaning for an abnormal amount of time or something of that nature. The point was, however, that the delay was apparent quite quickly after it had occurred and supervisory personnel could concentrate their efforts accordingly.

The system his division was operating did not replace the normally used records but rather was extracting hour by hour control information and bringing it all together in a comprehensive form. It might be possible or even desirable in some circumstances to have *all* the records in one place but this could only be determined

by careful investigation of the particular plant in question.

Benefits obtained from the expenditure in installing and running the system were as follows: just prior to the installation a request for capital expenditure for an additional 12 boxes was made on the grounds that production was being limited by lack of these items. An investigation showed, and the control system confirmed, that there were 12 boxes more than were needed and there was little doubt that additional boxes would in fact have made matters worse as without 'control' the more pieces of equipment present the more difficult it was to keep track of them. Also, output of the plant was believed to have increased by some 10 per cent but this figure was, of course, extremely difficult to check when the pattern of business was constantly changing. They did know quite definitely, however, that the production people, although rather diffident about the system when it was being developed, now said categorically that they would not attempt to run the plant without it.

Detergents from Sugar Now Made Under US Licence by Howards of Ilford

NOW being manufactured under licence from the Sugar Research Foundation by Howards of Ilford Ltd., are a range of sucrose esters which are non-ionic, surface-active agents. These esters are being marketed under Howards' trade name, Sorbester S.

The first four products of the range which are now available in pilot-plant quantities are Sorbester Emulsifier S 212 (sucrose di-laurate) Sorbester Emulsifier S 312 (sucrose tri-laurate) Sorbester Emulsifier S 18 (sucrose stearate, mixed mono-di) and Sorbester Emulsifier S 218 (sucrose di-stearate).

Manufacture of these esters is according to the Snell patent, the appropriate proportions of sugar being dissolved in a solvent and reacted with a methyl ester of the appropriate fatty acid in the presence of an alkaline catalyst, (e.g. lithium hydroxide). An alcoholysis reaction takes place and the methyl radicle of the methyl ester is replaced by sucrose to form the sugar ester of the fatty acid. Traces of dimethyl formamide can be removed by absorption on silica gel. To determine trace quantities of dimethyl formamide, the Du Pont Co. of US have developed a method which licensees have had distributed to them.

A Mixture

In almost all cases the product consists of a mixture of mono- and di- and possibly tri-esters. These are separated by the use of selective solvents. The typical Sorbester S. 212 and S 312 are both light brown solids. S 18 and S 218 are light brown powders. The odour of all four Sorbesters is slight. Sorbesters S 212 and S 312 have a soapy taste, but Sorbester S 18 is slightly sweet and Sorbester S 218 is virtually tasteless.

S 212, the di-laurate and S 312 the tri-laurate soften at approximately 40°C and at 80°C become pourable liquids. Sorbester S 18, the stearate, does not melt but softens at a temperature in excess of 40°C while Sorbester S 218, the di-stearate softens at approximately 60°C and becomes a pourable liquid at 90°C.

Sucrose di-laurate can be dispersed in water, aqueous dispersions up to 5 per cent being most widely used. It is soluble in alcohol and hydrocarbons, particularly when these solvents are warm. Suggested uses for this ester are as an emulsifier in food, pharmaceutical and cosmetic products. Its principal use is to form oil-in-water emulsions and with an auxiliary emulsifier, such as Sorbester P17 it can be used to form water-in-oil emulsions.

The tri-laurate (S 312) can be dispersed in water. Its solubility in organic solvents such as alcohol, vegetable oil and hydrocarbons, is increased by heating. This Sorbester can be considered as an emulsifier with applications in food, pharmaceutical and cosmetic preparations. It is used as an emulsifier in oil-in-water, and as an auxiliary water-in-oil emulsifier. It, too, may be used with Sorbester P17.

Although readily dispersed in water, sucrose stearate, S18, has only a limited solubility in cold organic solvents but its solubility rapidly increases when warm solvents are employed. Sucrose stearate is used as an emulsifier in cosmetic formulations and it is stated to have a wide field of potential uses in food and pharmaceutical emulsions. Its principal use is to form oil-in-water emulsions, but it can be used to form water-in-oil emulsions when employed as an auxiliary emulsifier.

In cosmetic formulations, sucrose distearate (S 218) has been found to be an excellent emulsifier. It also has applications in the food and pharmaceutical fields and it too is used to form oil-in-water emulsions; it can be used as an auxiliary water-in-oil emulsifier in conjunction with Sorbester P17.

Suggested applications in the food field for these sucrose esters are: Antispatter agents for margarine and cooking fats; anti-staling agents for bread and cake; emulsifiers for ice-cream, salad oils and other fat or oil-in-water emulsions; melting and dispersing agents, e.g. for dried food products, cocoa powder, dried milk and powdered eggs.

As the sucrose esters are in most cases tasteless as well as non-toxic, they are used as emulsifiers for medicine, ointments, creams, emulsifiers to aid digestion of fats, detergent for shampoos, toothpaste and cleansing creams.

It has been reported that the sugar esters are absorbed by the skin and are advantageous to moisture content and fat content of the skin. In the US, it is believed that sugar esters will have a large consumption in the preparation of animal and poultry feeding stuffs for improving the digestibility of the food. In fact, current estimates in the US, where the sugar esters have been developed for a little over two years, suggest that when fully established consumption will reach 200,000 tons a year.

It is believed that there is a wide scope for more esters in the UK.

Licences for manufacture of sugar ester detergents have been granted by the Sugar Research Foundation in Denmark, (Emulsion A/S, Juelsminde), France (Société Anonyme d'Innovations Chimiques, Neuilly-sur-Seine and La Compagnie Francaise de Produit Industriels, Asnieres), Italy (Ledoga SpA, Milan) Argentina (Noetinger Lepetit SA, Buenos Aires) Brazil (Laboratories Lepetit SA Sao Paulo) Mexico (Laboratories Lepetit de Mexico, Mexico City). In the US, licensees are Chas Pfizer and Co.; the Cuban-American Sugar Co., New York; and Berkeley Chemical Corp., Berkeley Heights, New Jersey.

Duke of Edinburgh Opens Manchester College Extensions

WITHOUT scientists and technologists, industry, medicine, nuclear power, defence and rockets would soon 'shrivel and disappear', said the Duke of Edinburgh, when he visited the Manchester College of Science and Technology, on 22 November, to open the new extensions of the College.

'Without them,' he continued, 'our days in a modern civilised state with a reasonable standard of living would be numbered.'

In the past many of our leaders had not been to a university, but on the other hand we could not afford any longer to leave it to chance to produce our scientific leaders. We had to keep solvent: it was not just a matter of keeping up with the Joneses.

'We are certainly going through a difficult period just now, but I firmly believe that the stock of talent, skill and ability, which has flowered so often in the history of these islands, is as great as ever.'

Three requirements for the success of the college were given:

(1) Help and co-operation from industry —in terms of money, equipment and part-time teachers.

(2) Industrialists who would demand people with the proper qualifications and give them jobs which exercised their talents to the full.

(3) Understanding of the importance of science.

All who had Britain's future well-being at heart must try to end the unreasoning prejudice against science and technology.

£65,000 Factory Extension for Genatosan

Two extensions, costing £65,000, to the Genatosan factory were opened on 22 November, by the Mayor of Loughborough, Alderman L. J. Tyers, J.P., and Sir Clavering Fison, chairman of the Fisons group of companies. The new buildings which consist principally of a welfare block and offices include a cafeteria designed to accommodate 120 people at a sitting, a recreation room equipped with television and radio, showerbaths, a surgery and rest room.

BELGIAN CHEMICAL INDUSTRY IN FIRST QUARTER OF 1957

Noticeable Increase in Exports

ACTIVITY of the Belgium chemical industry in the first quarter of this year has generally been good. Nitrogen production, in particular, has been noteworthy. Demand has remained firm, and order books are well filled. Since the end of the quarter certain products began to feel the reaction of the buying which seized the market in November-December 1956.

The coal stock position remained acute throughout the quarter. Fuel supplies have been assured in spite of restrictions. Distribution was normalised.

An increase in the price indexes' curve for primary materials began in November 1956, passed its maximum in December and January and fell towards the end of the quarter. The average for the two quarters is the same.

With regard to export prices, the average for the first quarter of 1957 is below that of the preceding quarter.

Nitrogen Production

	1,000 tons
Average January 1957	17.3
Monthly average 1956	19.3
Average February 1957	15.5
Average March 1957	18.0
Average for first quarter 1957	16.9

Compared with the average for 1956, nitrogen production diminished by 13 per cent in the course of the first quarter of this year. This regression was due to the accumulation of stocks following the cessation of exports to the East by virtue of the closure of the Suez Canal.

Production of Crude Tar

	1,000 tons
Monthly average 1956	20.7
Average January 1957	22.3
Average February 1957	20.0
Average March 1957	21.6
Monthly average for first quarter 1957	21.3

The further increase in production of tar noted in the first quarter of this year, after the high level of activity already established in 1956, marks the activities of the sectors using by-products of coal.

In the rubber industry, consumption of rubber, which fell somewhat last year, has regained its previous level.

Consumption of Raw Rubber

	1,000 tons
Average first quarter 1957	5.3
Average per quarter 1955	5.4
Average per quarter 1956	4.6

Employment levels have not varied very much. However, there has been an increase in the status of the type of workman.

After the drop occurring at the end of 1956 the value of Belgian chemical exports has reached a new high level for the first quarter of this year, being 4 per cent greater than the results for the whole of 1956 and 2 per cent greater compared with those for the first quarter in 1956. However, export tonnages have dropped by 6 per cent compared with the average for 1956.

Belgian chemical exports to Belgium's eight principal export markets show a noticeable increase for the first quarter of 1957 compared with the same quarter in 1956. This increase is particularly noticeable with regard to the Low Countries (+ 2.2 per cent), France (+ 1.9 per cent), W. Germany (+ 0.8 per cent) and Sweden (+ 1.2 per cent). Exports to Belgium's partners in the Common Market represent 35 per cent of the total against 30 per cent in the same quarter in 1956.

On the other hand, changes intervening recently in present trade for China have made this country Belgium's ninth largest customer in the first quarter this year, with sales of B fr. 55.4 millions (1.7 per cent), to the detriment of Belgium's sales to Hong-Kong.

Total Chemical Exports Monthly Average

	1,000 tons	Index	B. fr. million	Index
First quarter 1956	210	107	1,063	102
Fourth quarter 1956	171	87	1,015	97
For the year 1956	196	100	1,042	100
First quarter 1957	185	94	1,084	104

Principal Export Markets

	First quarter 1956		First quarter 1957	
Common market countries	B. fr. million	% of total	B. fr. million	% of total
Low Countries	416.0	13	494.6	15.2
France	242.7	7.6	308.0	9.5
W. Germany	213.0	6.7	245.3	7.5
Italy	83.4	2.6	89.5	2.8
Total	955.1	29.9	1,137.4	35.0
Others				
US	214.9	6.7	223.7	6.9
Congo	171.2	5.4	181.6	5.6
UK	151.4	4.7	158.4	4.9
Sweden	110.3	3.5	143.0	4.7
	50.2			57.1

Leeds University Donations

The University of Leeds has received for the school of chemistry £500 for 1957–58 from Monsanto Chemicals Ltd. The physical chemistry department has received £500 a year for two years from Imperial Chemical Industries Ltd., for work on radiation chemistry and radiochemical techniques, and for colour chemistry and dyeing research. £250 has been received from Courtaulds Ltd.

Dry Purification of Coal Gas

ECONOMIC aspects of the dry purification of coal gas were discussed by Mr. C. R. Hollingwood, chief chemist, South Lancashire Group, North Western Gas Board, at the autumn meeting of the Manchester and District Section of the Institution of Gas Engineers on 8 November.

He outlined a theoretical and practical approach to purifying gas in conventional oxide boxes as in the installations at St. Helens, Warrington and Wigan. He discussed oxygen content in the outlet purifiers and its effect on general purification and regeneration and the design of purifiers, with relative costs.

On the subject of mixing spent oxide, he said there was something to be gained by this. For example, if one works had 200 tons for sale at 52 per cent and another works had a similar quantity at 55 per cent, then it was possible to increase the revenue by mixing the two as follows:

200 × 52 × 1s 7½d	=	£855	16s 8d
200 × 55 × 1s 8½d	=	£939	11s 8d
		£1,795	8s 4d
400 × 53.5 × 1s 8¼d	=	£1,827	18s 4d
Increase in revenue		£32	10s 0d

1958 IEA Exhibition to be a Third Larger

THE 1958 Instruments, Electronics and Automation Exhibition, to be held at Olympia, London, in April, will be almost one third larger than the 1957 exhibition. With more than 60 new exhibitors, the British section is completely sold out and the organisers have a waiting list.

At a special exhibitors' meeting held at the close of the 1957 meeting it was decided that the 1958 meeting should be international, and already in the overseas section space has been booked by exhibitors from Belgium, Denmark, France, Germany, Holland, Sweden, Switzerland and the US.

Value of Chemical Exports and Imports

DECLARED value of chemical exports for the third quarter of 1957 was £64,865,000. The index number of volume was 132 (1954, 100). Import figures for the same period were:

Material	*Value as declared*	*Index No. of volume Third quarter 1957*
Rubber, including synthetic and reclaimed	£18,225,000	127
Crude fertilisers and crude minerals, excluding fuels	£10,808,000	108
Chemicals	£28,521,000	110

New Laboratory for CWS Preserve Group

A NEW well-equipped group central laboratory is now in operation at the Co-operative Wholesale Society's preserve works at Middleton. In addition to routine checks of current productions, the laboratory will conduct research into development and quality control on behalf of all four factories in the preserve group.

Covering an area of about 2,000 square feet, the suite comprises the main analytical laboratory, and a smaller special laboratory for the isolation of special research.

HULL FIRM LICENSED TO MAKE SWISS HT HEATING PLANTS

OF interest to the chemical process industry and to chemical engineers are the high temperature heating plants using the Swiss Bertrams' system. These are now being introduced to UK users by Rose, Downs and Thompson Ltd., Old Foundry, Hull, who have now been licensed by Hch. Bertrams Ltd., Basle, for the design, manufacture and supply within the British Commonwealth and Eire.

With this system, a closed circuit of heated Dowtherm is said to be thermally highly efficient and capable of automatic control to within 1 °C to 2 °C of any pre-determined temperature up to a maximum of 370 °C (700 °F). A series of vessels can operate simultaneously at varying temperatures between 60 °C and 370 °C, using one boiler in a closed circuit without loss of heating fluid. Because pressures within the circuit do not rise above 80 p.s.i.g., it is stated that the majority of existing plants could be coupled up with no alteration.

The Dowtherm, the heat transfer medium introduced in the US, is a constant boiling mixture of 73.5 per cent diphenyl oxide and 26.5 per cent diphenyl. It has an extremely low vapour pressure for high temperatures and a temperature of about 500 °F can be obtained with a boiler pressure of about 15 lb. p.s.i., and 700 °F with a boiler pressure of about 80 lb. p.s.i. Dowtherm also has a reasonably high latent heat and its heat transfer coefficient is good. It is claimed that there are practically no health hazards in the use of Dowtherm, which has a characteristic odour that can easily be detected.

Higher Efficiency

In the past the low fuel efficiency accompanying the use of Dowtherm has retarded its adoption in a number of industries. The Bertrams plant incorporates a number of developments in both the liquid and vapour phases, which have raised the efficiency of the boiler installation to about 80 per cent.

Variations in temperatures can be obtained rapidly because there is neither bulk in the furnace itself nor in its refractories to hold heat. The plants are entirely automatic both in temperature control and output, and are specially built for continuous working.

Dowtherm was originally designed to give a high temperature vapour at low pressures, but the Bertrams' system has advanced to the point where the liquid/liquid phase is as often used as the vapour phase, and because the heaters and evaporators are designed to provide forced circulation, there is said to be no difficulty in adapting the plant to either form of heating.

The design of the heating surfaces is claimed to give an elastic suspension, minimising the stresses in the actual plant and reducing maintenance costs. The safety instruments and controls furnished with the different plants are said to guarantee continuous operation without breakdown, even at the highest temperatures for which Dowtherm is available.

An advantage of the liquid circulation system is that in any one circuit a number of vessels can be employed with a guarantee that, up to the capacity of the furnace, each vessel will receive the requisite amount of heating medium. In fact units have been provided to feed as many as 20 vessels.

Liquid phase circuits feeding a number of vessels can be equipped with an ingenious device which allows each of the vessels to be heated by Dowtherm at a different temperature in secondary circuits. The operation of the regulating unit can be arranged for pneumatic, electric or hand control. Thus, highly complex heating and cooling problems in the chemical industry can be overcome by the use of this special arrangement in the circuits.

Under reasonable conditions it is possible with such a system to regulate the temperatures of reactions to within ± 2 °F using electro-pneumatic controls. A unique feature of this system is that while some vessels are being heated by Dowtherm, others can be cooled without taking the liquor from the major circuit.

Bertrams/Rosedowns high temperature heating plants are available in a number of commercial sizes. Firing can be provided either by gas or fuel oil. The close temperature control available enables products which may vary quickly with changes of temperature to be held at optimum conditions.

Multi-Channel Scintillation Spectrometer Now Produced for Industry Use

ONE of the new and immediate benefits to a wide field of processing industries in this atomic age will result, it is believed, from the forthcoming introduction and manufacture in Britain by Nuclear Enterprises (G B) Ltd., Edinburgh, of scintillation counters (Scintillometers) for industrial tracer investigations. Their Scintillometers have long been standard equipment used by the US and the Canadian atomic energy organisations and many features of these instruments are being incorporated in the new multi-channel scintillation spectrometers. At present, installations are being designed to suit particular problems of each customer.

Short-lived radioisotopes or 'radiotracers' are used in this equipment. Usually only gamma radiation of the tracer is counted, and an analysis is made of the intensity and energy of this radiation. Where the labelled material or substance flows in open ducts or conveyors, however, beta counting may be applied. Samples can similarly be analysed during processing.

If conditions of high humidity, moderately high temperatures or dusty atmosphere exist, these are taken into account in the design. The scintillation ratemeters used are suitably protected and can be portable. The instruments are normally constructed in two parts, viz. (1) the scintillation detector proper which can be placed on pipes, conveyors or troughs, and (2) the auxiliary electronics containing ratemeter, controls, current supply, and recorder, all of which can be placed up to 1,000 ft. from the detector if desired.

In some cases, it may be necessary to provide an auxiliary automatic counter in connection with the channel analyser. If necessary, the instrument can be battery operated. The complete equipment, portable in a case built for rugged conditions of work, could weigh as little as 40 lb. the recorder cable being carried separately.

The flow pattern of materials may be studied by means of the 'radiotracers.' A portion of the material to be studied is tracered with a gamma ray isotope so that its movement may be followed with a scintillometer outside without disturbing operations. One application of this system is the use of catalyst beads in continuous circulating systems of catalytic cracking plants. The beads are tracered to detect deviations from the normal flow pattern and to forecast shut downs which might become necessary. Other applications recently made have been to measure relative loads carried by parallel pipes in refining plants; to appraise baffle plate systems designed to promote uniform flow; and to trace the blocking of channels in distillation units.

Advantages of the instrument are as follows: To follow the progress and behaviour of one or more selected raw materials or ingredients simultaneously through the pipeline of processing and mixing at any stage of manufacture; to locate trouble at the precise point where no visual means exist; it can facilitate the standardisation of quality; production of standard yields; greater accuracy in costing; standardisation of use of raw materials; eliminates waste of raw materials; improves manufacturing methods; keep costly equipment fully utilised, and reduce processing and labour costs.

The system is already used experimentally by a UK firm in the fertiliser industry. It can also be used in assaying. In Scandinavia its application has been found to be effective in the chemical, paper and pulp industries.

International Standards Conference

The International Standards Organisation will be holding its conference in Manchester from 9-21 June 1958 which will be attended by between 800 and 1,000 delegates and their wives, from 42 countries, including a large delegation from East European countries. The congress meets every three years. Since the war it has been held in Paris, New York and Stockholm.

Overseas News

MAIN CONTRACTS FOR AFRICAN EXPLOSIVES' NITROGEN PLANT AT MODDERFONTEIN

MAIN contracts for the new £10 million nitrogen plant which African Explosives and Chemical Industries are building at Modderfontein dynamite plant have now been awarded. These are as follows:

The general design of the ammonia extension is being done by African Explosives in conjunction with ICI, Billingham. Detailed design and erection of the plant will be carried out by Power-Gas Corporation of Stockton and their local associated company, Ashmore, Benson and Pease of Johannesburg. Capacity of the No. 2 ammonia unit at Modderfontein is to be increased from 50,000 to 120,000 tons per year.

Lurgi GmbH of Frankfurt, Germany, have been awarded the contract for the coking plant for production of coke from Transvaal bituminous coal by a low temperature carbonisation process. This company will be responsible for the supply and erection of the plant. The work will be carried out through their local agents, Industrial Machinery Supplies Ltd., of Johannesburg. The amount of coal to be handled will be about 800 tons per day.

The contract for the oxygen plant required for gasification of the coke has gone to British Oxygen Linde of London. Most of the plant will be manufactured, however, by Linde of Germany. Both Linde companies will work through their local agents, African Oxygen Ltd. of Johannesburg. The plant will produce 300 tons per day of pure oxygen and a similar quantity of pure nitrogen.

The urea plant process will be that which has been developed by Dutch State Mines, Geleen, Holland. Werkspoor NV of Amsterdam have this contract and will work through their local agents, G. H. Langler and Co. Ltd. of Johannesburg. Capacity of this plant is to be 320 tons of prilled urea a day.

Hoechst's Nine-month Report Shows Record Turnover Likely

An interim report by Farbwerke Hoechst based on the first nine-months trading this year reports that a record turnover of DM17,000 million, or at least 15 per cent more than in 1956 is expected for the year. This turnover would exceed the company's own previous record turnover last year.

All sections are contributing to this record turnover but most active are dyestuffs, pharmaceuticals, synthetic resins and fully-synthetic fibres. Foreign sales are increasing rather more than those at home, averaging rather more than 30 per cent and reaching 50 per cent and more in some activities. Hoechst is further extending its network of distributing companies which include many formulating and packaging units particularly for pharamaceuticals. New plants are situated in Brazil, US, Spain, Austria and France. Investments in overseas facilities total DM27 million compared with the previous two years when DM32 million was invested in overseas companies.

Subsidies granted by the Federal German Government on fertilisers have enabled domestic sales to be increased. It is reported that there is a trend towards the production of complete fertiliser products and the company is having to rearrange its fertiliser section in line with this trend.

Carbide is reported to be still the most important raw material for plastics production; so the plant is being expanded. Acetylene is stated to be completely competitive against petrochemicals.

Production of acetylene by the Hoechst high-temperature pyrrolysis process is due to start in mid-1959 with a plant having a capacity of 17,000 tons. The natural gas supplied to Hoechst from the Darmstadt area is stated to be sufficient only for the manufacture of chlorinated methane compounds.

In the plastics division a large new polyvinyl unit has just been commissioned. Capacity for low pressure polythene is being increased from month to month. The company expects a rising demand for polythene particularly for cold water piping

Agreement Between Catalin Corp. and Centrale Rousselot

A five-year licence agreement providing for the exchange of technical information and 'know-how' has been signed by Catalin Corporation of America and Cie Centrale Rousselot, Paris, France. Catalin, a leading US producer of plastics materials and special chemicals, will disclose to Rousselot its formulas and technical information regarding the manufacture of solid one-stage and two-stage phenolic resins for adhesives, bonding, moulding and foundry uses. The agreement permits the French company to manufacture in Sweden, Switzerland and European countries now signatories to the North Atlantic Treaty Organisation. Rousselot also will supply information to Catalin on any processes the French company develops in the areas covered.

Chemicals Freed from Import Licence

Under an order valid from 1 October Belgium import regulations have been simplified. Import licences are not required now for the following goods:

Trisodium phosphate, chloramphenicol, antibiotics, their salts and other combinations, other than penicillin and chloramphenicol, coal tar dyes, cellulose nitrate, propellent powders and explosives.

Import licences are still required for:

Chlorine, carbon dioxide, chloromethane, chloroethane, bromoethane, hydrochloric acid, sodium hydroxide, potassium hydroxide, sodium borate, potassium carbonate, sodium silicate, salts of hypochlorous acid, other than bleaching powder, calcium hypochlorite, calcium carbide, chlorinated, brominated and iodated aliphatic hydrocarbons, other chlorinated hydrocarbons (carbon tetrachloride, trichlorethylene, tetrachlorethane etc.).

Pfizer Open New Plant in Chile

Leading representatives of the Government of Chile recently attended the opening of the new Pfizer plant in their country. The new earthquake-proof buildings incorporate the latest features of pharmaceutical plant design. With extensive water-softening and purifying equipment and its own emergency power supply, they include an air-conditioned sterile area for compounding drugs and the filling of capsules and vials. Equipped to produce fine antibiotics and other pharmaceuticals in many forms, from tablets to injectables, the plant's capacity is enough to supply outside needs as well as those of Chile itself.

Recalling the discovery of many specific drugs in South America, including digitalis in Chile, Mr. John J. Powers Jr., president of Pfizer International, stated that the company wished to continue this tradition of research and announced the foundation of the Pfizer Chilean Research Institute. One of the first programmes will involve a detailed study of local flora for possible use in producing substances of therapeutic value.

In addition to pharmaceutical and clinical laboratories and a technical library for the use of the Research Institute, other laboratories are planned for pharmacology and bacteriology.

Vinyl Acetate Production in Austria

Vinyl acetate is to be polymerised by Farbwerke Hoechst in Vienna. Plant will be completed by the end of this year. Supplies of monomer will be obtained from the parent plant of Hoechst at Frankfurt.

Canadian Glycol Production Increase

A recently completed expansion of Dow Chemical of Canada's Sarnia, Ontario, glycol plant has raised production capacity in excess of total current Canadian demand. The company say that the main market outlets for glycols are for use in manufacture of anti-freezes, explosives, cellulose film, synthetic fibres and resins. Glycol is also used in natural gas process.

Foskor Offered for Sale

Foskor, the South African state-sponsored Phosphate Development Corporation which was formed about five years ago, is to be sold to private interests. The plant at Phalaborwa in the North-Eastern Transvaal is to be offered to mining companies—as a copper mining area. A condition which will be attached to any sale is that any copper company buying the property must also exploit the phosphate ores, uneconomical as these have proved, for the corporation has been unable to produce rock phosphate which can be processed cheaply enough to compete as a fertiliser with those imported.

It is estimated that the South African Government has spent about £2,500,000

on the project. Recently the state-controlled South African Railways refused to build a 25-mile railway line from the Foskor plant to the present railhead at Mica. It was on 6 February this year that Foskor was debated in Parliament when these facts emerged. On the year's workings Foskor had lost £89,000 although it was generally believed that the actual working loss was double this figure and worked out at about £3 a ton. The main consumer was African Explosives, which instead of producing 200,000 tons of phosphate a year as predicted by the Government's spokesman, Mr. Eric Louw, was only producing between 70,000 and 80,000 tons a year.

The Phalaborwa's ores have proved igneous and the processing of them into the necessary superphosphate has been far more difficult and costly than it has been with the imported ores which were of a sedimentary type. The proposition of purchasing Foskor is being considered by two foreign companies, Rio Tinto and Newmont Copper, in conjunction with a South African company.

CSIR Developed Processes to be Leased-out

The following processes developed by the Pakistan Council of Scientific and Industrial Research are being leased out to industrial concerns for commercial exploitation:

(1) Refining of Baluchistan sulphur ore.
(2) Petrol gas plant.
(3) Adhesives for the packaging industry.
(4) Denaturant for methylated spirit.
(5) Preparation of mixed bile salts and acids from bile.

Non-technical notes and the prescribed proforma for submission of offers for any or all of the above processes are obtainable from CSIR in Karachi. Latest date for receipt of proformas is 31 December.

Chemicals Assessable to Duty in India

India's Central Board of Revenue, New Delhi, has ruled that acetyl methionine is correctly assessable to duty under Item No. 28A Indian Customs Tariff as it is not included in any of the recognised pharmacopoeias.

The Board have approved the change of practice whereby carbutamide would be assessable to duty under Item No. 28 (28) Indian Customs Tariff. It is also ruled that under this same item hydrofluoric acid should be assessed for duty.

Record Aspirin Production in US

US acetylsalicylic acid output may reach the 17 million lb. mark this year, according to a US report. Main aspirin producers in the US are Dow Chemical, Heyden Newport Chemical, Miles Laboratories, Monsanto, Norwich Pharmacal, and Sterling Drug. Output of the basic salicylic acid has in general kept pace with aspirin production, the annual figure currently being over 7½ million lb.

Over a five-year period, US aspirin prices are stated not to have varied more than 1 cent per lb. The currently quoted price is 55½ cents per lb., carload quantities and 61½ cents per lb. for 250-lb. drum lots. Estimated acetylsalicylic acid production this year is put at the equivalent of some 23.8 hundred million standard 5-grain tablets. Salicylic acid salts in 1956 made up a total of nearly one million lb. of which 776,000 lb. was for sodium salicylate.

Last year aspirin sales came seventh in the chemical industries annual dollar sales, totalling over $7 million. Recently, however, aspirin sales have been rising due to the increased prescribing of this drug for the treatment of Asian 'flu, 'flu types A and B, and for rheumatic and arthritic conditions.

Hoechst Heavy Water Plant Almost Complete

Heavy water is to be produced by Farbwerke Hoechst at the end of this year. The plant should have come on stream earlier but the contractors, Linde, could not deliver certain items on time, due to their being too heavily loaded with other work including that of petrochemical facilities at Hoechst. Production of heavy water is to be six tons a year and is destined for the German-designed experimental reactor now under construction at Karlsruhe.

Italian Foreign Trade in Chemical Products

Italy's imports and exports of chemical and pharmaceutical products for the first nine months of this year have now been published. The figures given below are in milliards of Italian lire.

	1955	1956	1957
Imports of chemical and pharmaceutical products	65.6	82.2	75.9
Exports of same	59.1	63.4	70.4

Finnish Import Relaxation

Laboratory chemicals are included in the latest list of materials which may be imported without quantitative restriction into Finland from certain Western European countries including the UK.

Natural Gas in Holland

The Netherlands Minister of Economic Affairs has recently stated that the natural gas industry has developed favourably in recent years. The supply of natural gas from the north-east of Holland could be raised from 14,125,000 cu. ft. per day to 19,423,000 cu. ft. The Nederlandse Aardolie Maatschappij has discovered promising deposits in the Province of South Holland.

It could now be assumed that sufficient natural gas deposits would be available to meet for about 20 years requirements in the Provinces of Groningen, Friesland, Drenthe, Overijssel and the northern part of Gelderland as well as in those parts of Gelderland which had hitherto imported gas from West Germany or were proposing to buy refinery gases. As a result of this development, the import of gas from Germany will be ended.

South African Uranium Price Talk

Means of protecting uranium-producing industries against price undercutting were discussed by Dr. van Rhijn, South African Minister of Economic Affairs with US and Canadian authorities during his visit to these two countries. The interests concerned, Dr. van Rhijn reports, have promised to set up a standing committee representing uranium-producing countries to deal with possible undercutting.

The Minister said that the US have offered to supply nuclear plans free of charge if South Africa wished to build an atomic power station and that the US, Canada and Britain had all offered technical help. Facilities for training personnel in atomic research had also been offered.

Work at Ravenna Nears Completion

Work on the construction of ANIC synthetic-rubber and nitrogen-fertilisers plant at Ravenna has entered its final stage. Some of the plants of the new factory are being tested and it is reported that synthetic ammonia and copolymerisation plants will start operating in six weeks or so.

The directors of the company have announced that the first bales of Italian synthetic rubber will be available to purchasers before the end of the current year.

Crude Benzene Refining in Germany

In a paper read in Saarbrucken to a branch of the German Chemical Society, Dr. Franz Trefry of Gelenkirchen said that until 1950, crude benzene was purified almost entirely by acid refining which gave losses between 5 to 2 per cent. Recently, pressure refining has been used on an increasing scale and gives losses of the order of 2 per cent. At present in Federal Germany, 80 per cent of crude benzene according to Dr. Trefry is being low-pressure refined, which indicates a big change in refining over the last five to six years.

Foreign Interest in Israel's Mineral Resources

INTEREST is being shown by foreign companies in the development of Israel's natural resources, particularly of potash, phosphates and copper, reports the Israeli Minister of Development. He announced recently that a Franco-American group are examining a scheme which provides for the laying of a pipeline from the southern end of the Dead Sea to a point on the Mediterranean or perhaps the Red Sea, to facilitate the extraction and export of Dead Sea potash and cut down transportation costs.

According to the Ebasco company, the cost of such a scheme would be about $1 million and take 15 months to set up. If such a scheme was implemented, the Minister estimates a rise in output of potash from 600,000 to one million tons a year, compared with current capacity at Sodom of 150,000 tons a year and present output of about 80,000 tons.

With regard to Israel's phosphate deposits, large concerns from Italy and Britain are understood to have discussed investment in a partnership with the Israeli Government for exploitation of these. They have also decided in principle to prospect for further deposits and to go ahead with extraction of phosphates at a later stage.

Several Japanese concerns are said to be interested in copper output at the Timna works, near Eilat.

URANIUM AND SULPHURIC ACID DEVELOPMENTS IN RAND GROUP

TWO of the gold and uranium mining companies in the Central Mining-Rand Mines Group give details of uranium developments and plants and sulphuric acid plants.

Blyvooriutzicht Gold Mining Co. report that due to improvements to their uranium plants during the year the tonnage of slurries treated increased by 62,659 tons to 1,866,011 tons and as a result of better recovery practice, uranium oxide production increased from 518,088 to 563,454 lb. Working profit from uranium and acid (subject to adjustment) accordingly rose by £219,659 to £1,412,423. Total working profit from these two sources is put at £6,668,235, some £268,179 higher than in the previous year.

The available ore reserve was estimated at 30 June last at 4,820,000 tons of an average value of 12.8 dwt. over a stoping width of 45.7 inches. Compared with the previous year, the ore reserve fell by 521,000 tons the value being 0.7 dwt. higher and the width 0.7 inch less. Value of the uranium contained in the available ore reserve at 0.424 lb. was 0.006 lb. per ton higher than in the previous estimate.

Expenditure on uranium and acid plants totalled £20,108 and £398,915 respectively. Some £140,000 remains to be spent on the completion of these plants.

Of the total loan of £4,068,281 including capitalised interest, obtained through the Atomic Energy Board, for the erection of the uranium plants an amount of £1,317,221 was repaid by 30 September this year, leaving a balance of £2,751,060 to be repaid.

The sulphuric acid plant was commissioned on 27 October last year and has operated at its designed capacity since that date. Of the loan of £757,601, including capitalised interest arranged through the Atomic Energy Board to finance construction of this plant, £47,093 has been repaid.

In the circulated statement by the chairman of Harmony Gold Mining Co. Ltd., working profit from uranium and pyrite is £1,174,633 (subject to adjustment). Some £336,195 of the company's indebtedness in respect of the loan from the Atomic Energy Board for the construction of their uranium and pyrite plants has been repaid. The balance still owing is £3,221,689.

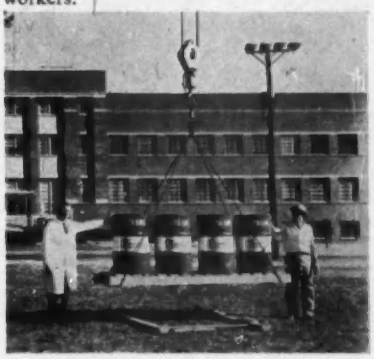
Payable ore developed during the year amounted to 1,178,000 tons with an average uranium oxide value of 0.683 lb. per ton over an estimated stoping width of 50.7 inches. Due to restricted development, there has been a decrease of 242,000 tons compared with the previous year. The uranium value was 0.032 lb. per ton higher.

Plans for expanding the scale of mining operations have been put in hand and construction work to increase the capacities of both the gold and uranium plants has started. An application has been submitted to the Uranium Production Committee of the Atomic Energy Board to extend the capacity of the pyrite flotation plant and to erect a sulphuric acid plant.

Capital expenditure during the year on the uranium plant, which at present has a rated capacity of 80,000 tons a month, amounted to £24,180. Expenditure on the construction of the pyrite flotation plant during the year totalled £302,706. The latter plant came into full production in March this year, with a capacity of 90 tons per day.

US Company develop new Adhesive

THE US company of Eastman Chemical Products Inc. are developing a new adhesive for bonding a wide range of materials, including metals, plastics, wood, rubber and ceramics. A colourless liquid known as 910 Adhesive, it is made from a polymerised cyanoacrylate monomer. The main feature of the new adhesive is the extreme speed of setting and curing claimed for it. Glass to glass bonds are said to be unbreakable within five to 15 seconds, wood to wood needs three to five minutes to set and steel to steel bonds set in 15 to 20 seconds, developing 2,000 p.s.i. tensile strength within 30 minutes and 5,000 pounds after 48 hours. Temperatures above 212°F for over 24 hours will destroy the bond, as will exposure to water near the boiling point. Eastman state that the adhesive is still in very limited production, but that one ounce sample kits are available to research workers.



Demonstration of bond strength of the Eastman adhesive

To demonstate the adhesive one drop was placed on the end of a two-inch steel rod. It was pressed against the end of a similar rod and held for a few seconds. With eye bolts attached the assembly was placed between a crane hook and a lifting harness, and within ten minutes the crane could lift drums weighing 2,000 lb.

Research Foundation's Progress in Study of Sugar Plastics

PROGRESS of sucrose-phenol-formaldehyde resins has been rapid and satisfying, notes Mr. H. B. Hass, president of Sugar Research Foundation Inc. and Sugar Information Inc. These resins have been developed and studied by the Bjorksten group and Forest Products Laboratory, Madison, Wisconsin.

It is reported that glass cloth laminates, employing sucrose-modified phenolics, in some cases had dry flexural strengths of 57,000 p.s.i. Uncured samples of similar resins have been distributed to several US phenolic resin producers for evaluation.

Other information indicates that substituted phenols depressed the curing rate, requiring higher temperatures which caramelised the sugar. Polyhydric phenols gave brown resins which are stated to warrant further study. Resorcinol-sucrose resins, when modified with other additives, had shear tensile strengths of 1,600 p.s.i., and wet bond strengths equal to those of commercial resorcinol resins.

Disodium-sucrate reacted with dichlorohexadiene yielded a mixture of monohexadiene sucrate and linear polymer which, with a cobalt drier and benzoyl peroxide catalyst dried to give tack-free films in two hours.

Di-and penta sodium sucrates reacted with ethylene chlorohydrin to give oils and solids with low degrees of substitution.

Dibasic acids react with sucrose in the presence of acetic anhydride to yield resins. It is stated that the oxalic and adipic products were excessively coloured. Phthalic anhydride reacted slowly to give a slightly coloured product. Maleic anhydride gave an amber resin from which the acetic acid could be removed by azeotropic distillation with toluene or chlorobenzene. Copolymerisation with styrene and vinyl acetate gave rigid and flexible products, respectively, which are described as clear, almost colourless, insoluble in boiling ethanol and water and exhibiting strong adhesion to glass.

The esters mentioned above are being investigated as well as the phenolic resins.

One-day Meeting on Education in Polarography

THE Polarographic Society is organising a one-day meeting on 'Education in polarography' at the Birmingham College of Technology on Thursday, 20 March 1958. Various aspects of the topic will be discussed and the programme will include a film on polarography, which has been prepared by the Czechoslovak Polarographic Research Institute under the direction of Professor J. Heyrovsky, president of the society. Dr. Masek will be coming from Prague to give a commentary on the first British showing of the film.

Non-members of the Polarographic Society who wish to receive further details when these are circulated should send their names and addresses to Mr. D. R. Curry, 28 St. Mary's Way, Baldock, Herts.

Any organisation or institution interested in the possibility of showing the two-hour film in other centres during Dr. Masek's visit should contact Mr. Curry as soon as possible.

MACROPLASTICS DEVELOPMENTS SHOWN IN AMSTERDAM

Polythene for Containers

ALTHOUGH the Macroplastics Exhibition held in Amsterdam from 13 to 20 November did not introduce any new plastics materials, it did demonstrate some notable developments both in materials and the uses made of them. This report by a special correspondent reviews some of the exhibits that were shown on more than 170 stands.

Particularly noticeable among the developments on the materials side was the considerable number of exhibits of large polythene containers and of comparatively thick polythene-lined standard drums and kegs. On the stand of Van Leer Vatenfabrieken NV a wide range of self-supporting moulded polythene containers including one with 210 A. gallon capacity made in the US was noted as well as range of polythene-lined drums made by Metal Containers Ltd.

In the same field Chemische Industrie Paul Shoemaker NV had on show a useful, strongly made, six-sided, self-supporting, moulded polythene container designed to permit stacking and allowing considerable saving of space, points of particular value in transporting chemicals. Also of interest were detachable polythene-lined drums with open-top polythene-lined lids, used mainly for the storage of powdered chemicals.

PVC Piping

Apart from the display of polythene articles by the above and other companies, considerable space was given by some exhibitors to the use of p.v.c. piping in the domestic cold water services, etc. This is probably due to the now well-established use of p.v.c. on the Continent before the introduction of polythene. A similar situation in reverse exists in UK where polythene is recognised primarily for use in domestic water services and where p.v.c. is almost unused for this purpose.

In view of the development of high-density-type polythenes (e.g. Ziegler, Philips, etc.) and the introduction on the Continent of UK manufactured polythene fittings, it is suggested that p.v.c. piping will eventually face considerable competition. Among the most interesting of exhibits in this field was that of Wavin of Hardenberg, who have developed an impressive saddle-type clamp joint which allows the break-in to a main p.v.c. pipeline without interruption of the services or the use of welding rod and torch, etc. The saddle joint incorporates a cutter which is operated by a key after the saddle has been clamped into position, the cut out piece being retained permanently in the hollow part of the cutter. A range of moulded p.v.c. pipe tees, elbows, etc., was also displayed.

P.S. Stokvis and Zowen NV also showed in considerable detail the use of p.v.c. and other piping in the water industry.

It was of interest to note the various companies showing plastics piping who advocated the use of adhesives; in the UK the approach to the use of adhesives with plastics tubing is much more conservative.

A recent development on show was that of slotted p.v.c. tubing for drainage purposes and also for use in filter beds. Wavin have carried out considerable work in developing machinery for this purpose—unfortunately no detail of this plant was available.

Considerable space was devoted to bearings made from various plastics materials, including nylon, etc. However, a stand that attracted considerable attention was that of NV Mekufa of Vroomshoop, where special importance was given to a display of various bearings made from Kufaleyt BWH, a material based on epoxy resin and containing graphite for lubrication purposes. Properties claimed for this material are:

Water absorption: Unlike nylon, Kufaleyt BWH has a very low water absorption: 0.25-0.35 per cent by weight (10 days at 20°C). Swelling is negligible.

Coefficient of Friction: Steel on Kufaleyt BWH, measured on a thrust-bearing with water lubrication: μ = 0.01-0.02 at an axial load of 300 kg.; μ = 0.003-0.005 at an axial load of 1,000 kg.

Thermal Conductivity is approx. 0.2 kcal/mm². °C. hr.

Strength: bending strength approx. 1,000 kg/cm²; tensile strength approx. 700 kg/cm².

Chemical Resistance: Kufaleyt BWH may be used for bearings exposed to aggressive vapours and/or fluids (hydrochloric acid, 10 per cent at 20°; sulphuric acid, 60 per cent at 20°; sodium hydroxide, 10 gr. per 100 at 20°; petrol, 100 per cent at 20°).

It is stated that a considerable market for Kufaleyt has developed on the Continent in the textile industry as well as in the paper industry.

Valves are now being developed from this material, as well as pumps for use with certain acids. A working example of this pump showed that there were no internal bearings in the pump, the impeller being externally supported and being so designed to allow for expansion.

From the claims made for Kufaleyt it would appear that valves, pumps and bearings, etc., composed of it, will be of real interest to the chemical and plastics engineer.

There were no outstanding new developments in materials. Hoechst, however, gave an interesting show of what is being manufactured from Hostalen low-pressure polythene.

Shell took the opportunity of introducing at this exhibition, their new trade name Carlona to cover production of low-pressure polythene in the UK, made under an exclusive licence covering the Ziegler process. At present it is intended to produce three grades, 800, 500 and 200 with melt indices of 2, 0.2 and 0.02 in order to increase molecular weight.

Of particular technical interest were the exhibits of the German Kunstoff-Schule. Through Hans Pickardt of Wuppertal-Elberfeld there is a book available containing physical samples and showing complete manufacturing processes of various plastics materials and the type of finished products made from them; the processes for such plastics as p.v.c. and polyurethane, etc., are included. These books are sold complete and will shortly be available in English; they should prove invaluable both for technical schools and for the technical training of sales personnel connected with the plastics and chemical industries.

J. Hoekstra NV of Utrecht displayed an impressive range of p.v.c. leathercloths with excellent designs and colours covering a considerable range of customer requirements.

NV Haagen concentrated on pigments for plastics and displayed to advantage the products of Williams (Hounslow) Ltd. for whom they are agents.

ICI Salt Mine as Underground Gasholder

WORK on what will be Britain's first underground gasholder is now being carried out by the brinefields section of Cassel Works, Billingham, of the ICI general chemicals division. The section is preparing an underground cavity in the Port Clarence salt measures about 1,200 ft. down and almost directly below the north shore of the Tees estuary.

For many years, the division has been pumping brine from these measures and as a result large cavities have been formed underground. About three years ago, the division was asked by the Northern Gas Board if domestic coal gas could be stored in those cavities. ICI felt it would be unsafe to use existing cavities, but they were prepared to develop a new cavity, the shape of which would be carefully controlled.

Work started with the assent of the Gas Board, and by March, 1957, it was clear that the salt was thick enough for the required cavity. Tubes were inserted and the salt is now being dissolved out of the borehole. It is hoped that by the middle of next year, a cavity will have been produced measuring 10,000 cu. metres, equivalent to 350,000 cu. ft. Then, brine will be displaced from the hole by gas under pressure.

Gas will be stored at a pressure of 450 lb. p.s.i. which means that storage capacity will be equivalent to 10 million cu. ft. of coal gas. The cost of the scheme is said to be 'very heavy,' but the board is satisfied that there will be substantial capital savings compared with a similar but conventional storage capacity.

PEOPLE in the news

● MR. J. W. PLOWMAN (Dewrance and Co. Ltd.) has been elected chairman of the British Valve Manufacturers' Association for 1957/58. The retiring chairman, MR. N. P. NEWMAN (Newman, Hender and Co. Ltd.) has been elected vice-chairman. New members of the executive committee are Mr. F. T. Bintcliffe (J. Blakeborough and Sons Ltd.), Mr. A. E. Dickinson (Smith Bros. and Co. (Hyson) Ltd.), Mr. H. L. Hammond (Crane Ltd.) and Mr. A. L. Trump (Saunders Valve Co. Ltd.).

● SIR DAVID ANDERSON, Ph.D., director of the Royal College of Science and Technology, Glasgow, has agreed to be chairman of the newly constituted Clean Air Council for Scotland.

● DR. THEODORE MORRIS SUGDEN, M.A., Ph.D., lecturer in chemistry, Cambridge University, has been elected an official fellow in Class A of Queens' College.

● MR. R. D. WATERMAN has resigned from the board of directors of E. B. Badger and Sons Ltd. on his retirement.

At the recent opening of the new £60,000 laboratories of Richard Hodgson and Sons Ltd., tanners and tanning extract makers, Beverley, were, l. to r., Dr. K. W. Pepper, director, British Leather Manufacturers' Research Association, N. L. Holmes, director, and Professor Donald Burton, leather industries department, Leeds University. Built and designed by the company, the laboratories have a staff of 38

● MR. A. E. PARRITT is to be contracts engineering manager and MR. D. PHELPS to be manager of the application engineering department of Foxboro-Yoxall Ltd. This follows the move of the company to their new plant at Redhill.

● MR. G. E. HUGHES has been appointed managing director of African Explosives and Chemical Industries, a company partly owned by ICI. He was until recently managing director of ICI, South Africa.

● LORD ADRIAN, O.M., F.R.S., is to succeed LORD TEDDER as vice-chancellor of the University of Cambridge.

● DR. H. G. REID, first general manager of the ICI Severnside project, has been appointed president of ICI (New York) Ltd. with effect from the 1 January 1958. His place as general manager is being taken by DR. H. S. HIRST, of the company's Billingham division in Co. Durham. Dr. Hirst was a member of the team who planned ICI's great Wilton Works in North Yorkshire, and has recently been technical department manager of the Billingham division. MR. J. D. COUSIN, until recently the secretary of the ICI salt division in Cheshire, is now secretary of the Severnside project.

● MR. A. P. BESSON has left the board of Besson and Robinson, a subsidiary of the Gas Purification and Chemical Co. He has formed a new company, A. P. Besson and Partner.

● MR. R. G. LEWIS has been appointed a director of Birwelco Ltd., and Brown Fintube (Great Britain) Ltd. He is already general manager of these companies.

● MR. L. C. PERCIVAL, chief metallurgist of the British Oxygen group of companies, has been appointed president of the North London Branch of the Institute of Welding. A founder-member of the branch, he previously held the office of president from 1949–50. He has been with British Oxygen for 39 years.

● MR. ALLEN G. CLARK has resigned from the board of National Plastics and its subsidiary companies.

● Amber Chemical Co. have appointed MR. HUMPHREY WIGAN as a director. Mr. Wigan is already a director of Amber Oils and of Amber Pharmaceuticals.

E. J. Wain, general purchasing agent of Canadian Industries Ltd., is a member of the Canadian Trade Mission now in the U.K. (See p. 878).

● DR. T. S. WEST, Medola Medallist for 1956, will deliver his lecture on 'Some recent developments in organic and inorganic analytical chemistry' on 10 December (5.30 p.m.) in the main chemistry lecture theatre, Royal College of Science, under the joint auspices of the Royal Institute of Chemistry and the Imperial College Chemical Society.

● SIR EDWARD APPLETON has been elected an honorary fellow of the Royal Institute of Chemistry in tribute to his achievements as a physicist and a man of vision.

● DR. H. C. S. de WHALLEY has retired from his position as Director of Research, Tate and Lyle Research Laboratories, Keston.

● MR. T. W. MCCULLOUGH, O.B.E., a Deputy Chief Inspector of Factories, takes up the appointment of Chief Inspector of Factories as from 1 January next on the retirement of SIR GEORGE BARNETT. Mr. McCullough is a graduate in mechanical engineering of the University of Glasgow. After serving an apprenticeship, he worked in a Glasgow shipyard and later held an appointment in the Ministry of Finance in Northern Ireland. In 1926, he became a factory inspector, serving in London, Glasgow, Fife and other parts of Scotland and Sheffield.

T. W. McCullough

Mr. McCullough was a member of the Garrett Committee on 'Conditions in Iron Foundries' from 1946–47 and has been chairman of joint standing committees set up in connection with various industries such as iron, steel and non-ferrous foundries from 1954–56.

● DR. JOHN R. BROWN, JR., has been elected a director and vice-president in charge of research and development for the Colgate-Palmolive Co., New York, US. Dr. Brown, who joined the organisation from his post as vice-president research and development of the Spencer Chemical Co., began his career in 1938 with the Esso laboratories, chemical division of Standard Oil Development Co.

Obituary

MR. JAMES HARNAMAN, M.B.E. who died recently, at the age of 68, was until his retirement under the age rule 18 months ago, a director of Laporte Chemicals Ltd. (formerly B. Laporte Ltd.). He had been with the company since 1925, and was a director from 1945 to the date of his retirement. He had served for many years on the council of the Association of Chemical and Allied Employers. Probably Mr. Harnaman's finest contribution to chemical industry was the successful starting up of Laporte's new electrolytic hydrogen peroxide plant at Warrington, in 1948, and its expansion under his management as resident director.

Will

MR. W. A. C. CHRYSTAL, joint managing director of British Chrome and Chemicals Ltd., and director of a number of other companies, who died on 1 June in a fire at his home, aged 45, left personal estate in England and Scotland valued at £240,045.

Commercial News

Boake, Roberts' Show Higher Six Months Profit

UNAUDITED accounts for the half-year to 29 September last for A. Boake, Roberts and Co. (Holdings) show a profit before taxation of £180,307 against £59,000. This improved profit, the directors state, compares favourably with the results of the second half of the last financial year which ended on 31 March 1957, and reflects the maintenance of satisfactory trading conditions during the six months.

A higher interim dividend of 5 per cent (4 per cent) in respect of the year ending 31 March 1958 has been declared, but the directors remark that while they could see no justification for forecasting an increase in the total dividend for the year (15 per cent for 1956–57) they consider that in response to the suggestion often made, the interim dividend should be a higher proportion in relation to the final dividend.

It is reported that since the end of September, the directors have not discerned any material change in the state of trade, but they feel that the effect of the increased bank rate and the restrictions imposed on capital investment may yet have an effect on the current trading year. The report indicates that the start of operations on the new plant at Widnes is likely to be delayed by an additional month or two. However, 'vigorous' efforts are being made to bring this plant into commission at the earliest date.

Catalin Ltd.

Plastics manufacturers, Catalin Ltd., report a net group profit, before tax, for the third quarter ended 5 October last of £6,816, making £23,231 for nine months, compared with £19,594. This improvement in the results is due, the company state, to the continued expansion in sales, to which new processes have made a significant contribution. Prospects for the last quarter are 'reasonably encouraging', the report states. A continuation of profits at present level is anticipated states Mr. J. E. Currie, the chairman.

British Chrome and Brotherton

Acceptance of the share exchange terms under the proposed merger plan of British Chrome and Chemicals (Holdings) and Brotherton and Co. is recommended by the directors of both companies. Details of the proposed share exchange were given in CHEMICAL AGE, 2 November, p. 733.

The holding company, British Chrome and Chemicals, will become a parent company with two main subsidiaries, British Chrome and Chemicals and Brothertons. As soon as convenient, the holding company's name will be changed and when the amalgamation is effected, the board will be reconstituted. Mr. M. J. C. Hutton-Wilson is to be chairman and managing director. Other members of the board will be Mr. W. Astles, Mr. J. T. Barrie, Mr. G. Brotherton-Ratcliffe, Mr. A. C. J. Burningham, Dr. C. H. Clarke and Mr. A. Henderson.

If the amalgamation is effected, existing members of British Chrome will hold £1,039,164 ordinary and £262,250 preference in the holding company and members of Brotherton, £1,025,000 ordinary and £250,000 preference.

British Chrome are calling an extraordinary meeting at Stockton-on-Tees on 16 December to consider increasing the capital from £1.4 million to £3 million by the creation of 250,000 new 6 per cent preference and 4.1 million ordinary shares for the purpose of acquiring not less than 90 per cent of Brotherton's issued capital.

Elliott-Automation and Rotameter

Elliott-Automation Ltd. have purchased the entire share capital of Rotameter Manufacturing Co. Ltd. in consideration of the allotment of 269,000 ordinary shares of 5s each in Elliott-Automation. Rotameter are manufacturers of Variable Area Flowmeters and Density Meters. Their products represent an important addition to the Elliott-Automation group's range of instrumentation and will further widen the scope of the group's service to process industries.

Rotameter will remain under the management under which it has grown to its present size, namely, Mr. H. R. Trost and Mr. A. H. Trost as joint managing directors and Mr. F. C. Whalen as technical director. The business will continue at Croydon.

Allen and Hanburys

Group profits of Allen and Hanburys Ltd. increased from £259,457 to £346,447 in the year ended 30 June last. After taxation of £193,672 (£144,801) the net profit is up from £114,656 to £152,775. The parent's net profit is £111,347 (£78,702).

A final dividend of 10 per cent has been recommended on the £488,400 ordinary capital which was increased last March by a one-for-two 'rights' issue. With the 7½ per cent interim on the smaller capital the total dividend for the year is 17½ per cent (unchanged).

Evans Medical Supplies Ltd.

An interim dividend of 2½d—two-and-a-half pence—less tax, per 5s ordinary stock unit, on account of the year ending 31 December 1957 has been declared by the directors of Evans Medical Supplies Ltd. For 1956 the interim dividend was 1½d followed by a final dividend of 5d, making 6½d, less tax, for the year.

It is stated that this increase in the interim dividend to 2½d should not be regarded as indicating that the total distribution for 1957 will be higher than for 1956.

Olin Mathieson Chemical

Sales and operating revenues of Olin Mathieson Chemical Corporation in the US and Canada during the quarter ended 30 September, totalled $158,875,993 a gain of about 2 per cent over the same 1956 period. Net operating profit for the third quarter amounted to $9,079,445, and was equal to 67 cents per share (74 cents per share).

In their report Mr. Thomas S. Nichols, chairman, and Mr. Stanley de J. Osborne, president, attributed the improved sales performance, in part, to the corporation's increased capacity for cellulose film, chlor-alkali products and aluminium fabrications and to the continued high rate of operations maintained this year by the E. R. Squibb and Sons division.

For the nine-month period, sales and operating revenues of the corporation in the US and Canada amounted to $448,505,445 ($456,907,518). Net operating profit in the first nine months of 1957 amounted to $28,794,421, equal to $2.15 per share of common stock ($35,903,232, or $2.71 per share) including 34 cents per share of non-recurring net profit.

Authorised shares of common stock of the corporation are to be increased from 15,000,000 to 20,000,000.

Terylene Patent Situation

A spokesman of Calico Printers Association has denied recent reports that the company had applied for an extension of its 'Terylene' polyester fibre patents in the UK. The position remains as outlined in the chairman's annual report in October last, when it was stated that an application would be submitted at the appropriate time in the near future.

Under the Patents Act the latest date for applying for an extension to the patents which expire next July would be mid-January next. Maximum extension time which may be granted is 10 years. It is reported that Imperial Chemical Industries Ltd., who hold the UK licence from Calico Printers will assist the Association in its application.

INCREASES OF CAPITAL

BRITISH SCHERING MANUFACTURING LABORATORIES LTD., manufacturers of pharmaceutical preparations, 229/231 Kensington High Street, London W8. Increased by £215,000, beyond the registered capital of £10,000.

ALCHEMY LTD., chemical product manufacturers, Brettenham House, Lancaster Place, London WC2. Increased by £90,000, beyond the registered capital of £10,000.

NUMOL LTD. Manufacturing chemists, etc., 80 Elswick Road, Newcastle on Tyne 4. Increased by £40,000, beyond the registered capital of £10,000.

LONDON GAZETTE

Voluntary Winding-up

(A resolution for the voluntary winding-up of a company does not necessarily imply liabilities. Frequently it is for purposes of internal reorganisation and notice is purely formal.)

LEAD LININGS LTD., Bold Iron Works, St. Helens. By special resolution, 23 October. Ralph Scott Evans is appointed liquidator.

TINTEX DYES (Scotland) Ltd. By special resolution, 7 November at 127 High Street, Croydon, Surrey. Arthur Hugh Spicer is appointed liquidator.

STAR DYES MANUFACTURING CO. LTD. By special resolution, 7 November at 127 High Street, Croydon, Surrey. Arthur Hugh Spicer is appointed liquidator.

In Parliament

Cheaper Sources of Gas

EFFORTS to find new sources of cheaper gas were reviewed by Mr. Maudling during a debate on the power industries on Tuesday night. He reported progress in the following: Considerable prospects of valuable developments in the Lergi process for complete gasification of coal; two plants are planned, one in Scotland, the other in the West Midlands. Developments in hydrogenation processes for coal and oil were promising. Use of surplus products from refineries were being considered, as also the possibility of developing gas from imported oil. If measures to import methane were successful, gas of very high quality at a remarkably low price would be possible; and a useful new source of gas at a competitive price would be methane drained from the pits.

Emigration of Scientists

Mr. Harold Macmillan, Prime Minister, last week refused requests to arrange for records to be kept of all chemists, engineers and physicists who emigrate. He was also asked to make a special effort to find out where those scientists and technologists remaining in this country were being employed.

Mr. J. McInnes (Lab., Glasgow Central) said the Advisory Council on Scientific Policy was conscious of the widespread belief that this emigration had increased considerably during the past few years. There was, however, no adequate information of the numbers involved.

Mr. Macmillan explained that to maintain such records would involve bringing back powers of compulsory registration of all scientists, engineers, etc., which the Ministry of Labour had during the war. He was not prepared to do that. The point was how to obtain those figures in the most effective way without the use of compulsory powers.

Exemption for Scientists

Mr. Iain Macleod, Minister of Labour, has asked his technical personnel committee for its advice on the question of granting indefinite deferment to science and engineering graduates with second class honours degrees who took any employment for which a science or engineering degree was required. Such deferment if granted would bring these graduates into line with those with first class honours. The committee is to consider the matter in the course of the next week or so.

Anglo-Italian Co-operation

Sir Claude Gibbs, president of Nuclear Power Plant Co., has reached a preliminary agreement with On. Enrico Mattei, president of Agip Nucleare, by which the British company will place at the disposal of the Italian, technical information, drawings, and results of its experience in nuclear sector, besides supplying parts of the equipment which, as yet, cannot be manufactured in Italy.

This technical assistance will be given exclusively to Italy, and it is intended to enable Agip Nucleare to go ahead with its plans concerning the erection of nuclear-electric centrals in Italy. Nuclear Power Plant Co. will also train a number of Italian technicians.

This week, Mr. D. E. H. Peirson, secretary of the UK Atomic Energy Authority, began talks in Italy with Italian Atomic Energy experts.

Market Reports

HEAVY CHEMICALS MARKET STEADY

LONDON Steady conditions have prevailed on the industrial chemicals market during the past week with a good movement of supplies against contracts. The flow of new enquiry, although not substantial, remains at about the level of recent weeks and covers a wide range of heavy and fine chemicals. Export trade remains fairly steady.

Prices in most sections of the market have moved within narrow limits although quotations for the non-ferrous metal compounds have again been reduced. Copper sulphate 98/100 per cent purity is £71 per ton less 2 per cent f.o.b. Liverpool. The basis prices for white and red lead are now £121 and £111 5s per ton respectively. The new price for litharge is £113 5s per ton as from 22 November. There is a good outlet for most of the coal-tar products.

MANCHESTER Prices held a steady undertone in nearly all sections of the Manchester market for heavy chemicals, one of the main exceptions during the past week having been a further cut of £2 a ton in the export price of sulphate of copper. There has been a fair amount of enquiry circulating for the leading alkalis and other products and, on the whole, deliveries under contracts to the main industrial outlets have been on a reasonably steady scale. Fresh enquiries on overseas account have also been dealt with. In the fertiliser section there is a steady call for the higher grades of basic slag and a fair demand for the compounds and one or two other lines. Most of the tar products are going steadily into consumption.

GLASGOW The general trend throughout the Scottish heavy chemical market has been quiet during the past week, although trade has by no means been dull, and the demand for the usual run of acids, alkalis, etc., is more than likely up to standard. Some uncertainty is evident owing to the falling prices in basic metals as far as forward buying is concerned. The usual seasonal demand for agricultural chemicals is being well maintained, and enquiries for export are normal.

FOR YOUR DIARY

MONDAY 2 DECEMBER

Royal Institute of Chemistry—London; 14 Belgrave Square SW1. 6 p.m. 'High pressure reactions' by Professor D. M. Newitt.

TUESDAY 3 DECEMBER

Incorporated Plant Engineers—London; Royal Society of Arts, John Adam Street WC2. 7 p.m. 'The impact of automation on the plant engineer' by J. F. Coales.

Institution of Chemical Engineers—London; Geological Society, Burlington House, Piccadilly W1. 5.30 p.m. 'Shell gasification process and its application to industry' by M. J. Gattiker.

Society of Chemical Industry—Birmingham; Birmingham and Midland Institute, Paradise Street, 2. 6.30 p.m. 'Nuclear magnetic resonance' by Dr. R. E. Richards.

WEDNESDAY 4 DECEMBER

Institute of Fuel—London; Institution of Civil Engineers, Great George Street SW1. 5.30 p.m. 'The manufacture of town gas from liquid or gaseous fuels' by E. J. Lawton.

Institute of Metals & Iron & Steel Institute—London; Church House, Great Smith Street SW1. 10.30 a.m. Inaugural meeting of powder metallurgy group.

NW Fuel Luncheon Club—Manchester; Engineers' Club, Albert Square, 2. 12.15 p.m. 'Atomic energy and our future' by D. W. Cole.

Plastics Institute—Newcastle-on-Tyne; Eldon Grill, Grey Street. 7 p.m. 'Reinforced alkyd moulding material and its application' by G. Bell.

Society for Analytical Chemistry—London; Burlington House, Piccadilly W1. 6.30 p.m. Discussion; 'Standardisation' opened by R. C. Chirnside, L. S. Theobald, J. Haslam and G. Ingram.

Society of Chemical Industry—Belfast; Agricultural Lecture Theatre, Elmwood Avenue. 7.15 p.m. 'Rayon manufacture' by F. E. Large.

THURSDAY 5 DECEMBER

All Chemical Societies—Glasgow; Central Hotel. 6.30 for 7 p.m. The Ramsay Dinner.

CS, RIC & SCI—Aberdeen; Physiology Lecture Room, Marischal College. 7.45 p.m. 'Pesticides—problems and prospects' by Dr. R. A. E. Galley.

Institute of Metals & SCI—Bristol; University Chemical Dept., Woodland Road, 8. 6.30 p.m. 'Design and operation of waste heat boilers in the chemical industry' by W. Gregson.

Royal Institute of Chemistry—London: Battersea College of Technology, Battersea Park Road SW11. 'The modern approach to inorganic chemistry in schools, colleges and industry' by Professor R. S. Nyholm.

RIC & SCI—Falkirk; Lea Park Rooms. 7.30 p.m. 'Chemotherapy' by Dr. F. L. Rose.

Society for Analytical Chemistry—Nottingham; Gas Showrooms. 7 p.m. Discussion; 'Non-aqueous titrations' opened by E. H. Tinley.

Society of Chemical Industry—Nottingham; Nottingham and District Technical College. 7.30 p.m. 'Automatic control in fine chemical manufacture' by A. H. Isaac.

FRIDAY 6 DECEMBER

CS, RIC & SCI—Glasgow; Royal College of Science and Technology. 7.15 p.m. 'William Ramsay—a Glasgow man' by A. Kent.

Society of Chemical Industry—London; 14 Belgrave Square SW1. 6.30 p.m. 'Problems in supplying laboratory chemicals' by K. G. A. Hammer.

SATURDAY 7 DECEMBER

Society for Analytical Chemistry—Liverpool; City Laboratories, Mount Pleasant, 3. 2.15 p.m. 'Present trends in the analysis of feeding stuffs' by H. Pritchard.

Methane Shipments

Dr. J. Burns, chief engineer of the North Thames Gas Board, has recently said that three shipments of liquid methane from the US would probably provide the board with enough 'know-how' to allow them to make long-term plans. Providing there was security of supply and the trials proved successful, it was reasonable to suppose that orders for large methane tankers would be placed with British shipyards. Such vessels were already being planned.

Change of Name

REDEX PROPRIETARIES LTD., chemical products manufacturers, etc., Carlton Hill, Leeds 2, have changed their name to C.E.F. Ltd.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents),' which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London, WC2, price 3s. 3d. including postage; annual subscription £8.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection on 1 January

Forgeable high strength austenitic alloy steel with niobium-tantalum addition. Babcock & Wilcox Co. **788 468**

Heterocyclic compounds. Allen & Hanburys Ltd. **788 370**

Process for the production of pure aluminium. Ziegler, K. **788 619**

Continuous polyamide production. Farbenfabriken Bayer AG. **788 521**

Water-soluble derivatives of 5-nitro furfural and production thereof. Bravard, L. E. **788 373**

Production of alcohols by oxo process. Gulf Research & Development Co. **788 473**

Purifying synthetic alcohol by a distillation process. National Petro-Chemicals Corp. **788 475**

Preparing aviation fuels and liquid hydrocarbon mixtures suitable as aviation fuel components. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **788 571**

Preparing motor fuels and liquid hydrocarbon mixtures suitable as motor fuel components. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **788 572**

Process for the resolution and recovery in the pure state of hydrazides and amides of α-lysergic acid or DL-isolysergic acid. Cilag Ltd. **788 416**

Copolyesters. Goodyear Tire & Rubber Co. **788 377**

Preservation of natural rubber latex. General Latex & Chemical Corp. **788 580**

Production of gaseous hydrogen chloride from aqueous hydrochloric acid by distillation. Knapsack-Griesheim AG. **788 421**

Manufacture of fibres from thermoplastic materials such as glass. Soc. Anon. des Manufactures des Glaces et Products Chimiques de St.-Gobain, Chauny & Cirey. **788 491**

Electrodeposition of chromium. Harshaw Chemical Co. **788 584**

Monoalkylaminoalkyl esters of substituted benzoic acids. Abbott Laboratories. **788 585**

Process and solutions for discharging filter and antihalation dyes in photographic films. General Aniline & Film Corp. **788 425**

Gas filters. American Air Filter Co., Inc. **788 636**

Resinous coating materials and processes for the manufacture of such materials. Beck & Co. Ges. **788 426**

Manufacture of monovinyl acetylene. Du Pont de Nemours & Co., E. I. **788 380**

Compositions containing epoxy compound for treating synthetic fibres. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **788 381**

Derivatives of leucauramine. National Cash Register Co. **788 427**

Stabilisation of polymers of vinylidene chloride. Badische Anilin- & Soda-Fabrik AG. **788 428**

Hydroisomerisation process. Gulf Research & Development Co. **788 588**

Recovery of zinc crust obtained in the separation of silver from lead. Soc. Miniere & Metallurgique de Penarroya, and Leferrer, F. **788 525**

Vat dyestuffs of the anthraquinone series. Farbenfabriken Bayer AG. **788 433**

Stable kallikrein preparations. Farbenfabriken Bayer AG. **788 382**

Pyridazine compounds and process of preparing the latter. Chimie et Atomistique. **788 502**

Herbicidal compositions. American Chemical Paint Co. **788 434**

Beryllium hydroxide. Pechiney Compagnie de Produits Chimiques et Electrometallurgiques. **788 383**

10-(1′ or 2′ naphthoyl)-3; 7-bis (dimethylamino) phenothiazine. National Cash Register Co. **788 384**

Derivatives of 10-benzoyl-3, 7-bis (dimethylamino) phenothiazine. National Cash Register Co. **788 390**

Joining of titanium or its alloys to stainless steel. Sumitomo Kinzokukogyo Kabushiki Kaisha. **788 589**

Manufacture of polyene compounds. Hoffmann-La Roche & Co. AG., F. **788 387**

Fungicidal composition. Mallinckrodt Chemical Works. **788 590**

Production of cycloaliphatic ketoximes and their hydrochlorides. Badische Anilin- & Soda-Fabrik AG. **788 436**

Ethoxyline resin compositions and their preparation. General Electric Co. **788 437**

Apparatus for the manufacture of diketene. Hoffmann-La Roche & Co. AG. [Divided out of 788 596.] **788 597**

Open to public inspection on 8 January

Modified rubber compositions. British Rubber Producers' Research Assoc. **788 651**

Diquaternary compounds. Wellcome Foundation Ltd. **788 914**

Diquaternary compounds. Wellcome Foundation Ltd. [Cognate application 7730.] [Divided out of 788 914.] **788 915**

Silicone rubber. Wacker-Chemie Ges. **788 653**

Method for the preservation and durable vitaminisation of roasted and ground coffee. Jenny, H. **788 724**

Derivatives of 2-keto-, 3, 4, 5, 6, 7, 8, 10-octahydronaphthyl-(7)-methane and a process for preparing same. Takeda Pharmaceutical Industries Ltd. **788 784**

Laminated ceramic articles and slip casting method of producing same. Union Carbide Corp. **788 918**

Mandelo-nitrile glucuronosides and method of making same. Krebs, E. T., and Krebs, jun., E. T. **788 855**

Compounds of selenium and process for making them. Ciba Ltd. **788 725**

Separation of organic mixtures. Soc. des Usines Chimiques Rhone-Poulenc. **788 931**

Process for the manufacture of alkali metal silicates. Farbwerke Hoechst AG. **788 933**

Preparation of methine dyestuffs. Gevaert Photo-Producten N.V. **788 901**

Polymerisable cyclic compounds. Kellogg Co., M. W. **788 662**

Basically substituted acid amides and process for their manufacture. Farbwerke Hoechst AG. **788 936**

Fertilisers. Fisons Ltd. **788 790**

Gas cooled nuclear reactors. UK Atomic Energy Authority. **788 902**

Composite antioxidants comprising bis-(hydroxy-dimethylphenyl) derivatives of butane and methane. Imperial Chemical Industries Ltd. **788 794**

Inhibition of decomposition of nitrate esters. National Research Development Corp. **788 946**

Antibiotic compositions for treating plants. Pfizer & Co., Inc., C. **788 668**

Sonic gas analysers. Parsons & Co. Ltd., C. A. **788 801**

Pharmaceutical compositions. Imperial Chemical Industries Ltd. **788 739** **788 740**

Device for obtaining a measurement of the colour or opacity of a fluid. Candy Filter Co. Ltd., and Aitken, R. W. **788 803**

Production of alkyl aluminium compounds. Imperial Chemical Industries Ltd. **788 671**

Formation of hard inter-metallic coatings from electrodeposited layers of titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, molybdenum and tungsten. Horizons, Inc. **788 804**

Electrodeposition of chromium. Harshaw Chemical Co. **788 805**

Compositions comprising polyepoxides and silicon-containing compounds, and cured products prepared therefrom. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **788 806**

Stabilising and softening of the halogen-containing organic compounds. Dehydag Deutsche Hydrierwerke Ges. **788 743**

Dihydric phenols and resinous products prepared therefrom. American Cyanamid Co. **788 747**

Organopolysiloxanes. General Electric Co. **788 748**

Alcohol-amine complexes. Rohm & Haas. **788 674**

Heterocyclic derivatives and processes for their preparation. Soc. des Usines Chemiques Rhone-Poulenc. **788 868**

Manufacture of white portland cement clinker. Dyckerhoff Portland-Zementwerke. **788 869**

Portable water-distillation apparatus. Lea Bridge Industries Ltd. **788 753**

Stabilisation of hydrogen peroxide. Laporte Chemicals Ltd. **788 951**

Preparation of soil improving agents. Rohm & Haas Ges. **788 677**

Curing or vulcanising organopolysiloxanes. Midland Silicones Ltd. **788 953**

Rubber composition. Columbia-Southern Chemical Corp. **788 874**

Fluid dispensing apparatus. Struver Ges. Aggregatebau. **788 818**

Spiro heterocyclic dithiophosphoric acids and the production thereof. Union Carbide Corp. **788 954**

Liquifying machines for chocolate and cocoa masses. Buhler, Geb. **788 757**

Liquid laundry starch. Staley Manufacturing Co., A. E. **788 758**

Preparation of gas-expanded organic plastic materials. United States Rubber Co. **788 822**

Copolymers, their production and use. Du Pont de Nemours & Co., E. I. **788 955**

Purification of dialkyl esters of terephthalic acid. Henkel & Cie, Ges. **788 679**

BRITISH CHEMICAL PRICES

GENERAL CHEMICALS

Acetic Acid. D/d in ret. barrels (tech. acid barrels free); in glass carboys, £8; demijohns, £12 extra. 80% tech., 10 tons, £97; 80% pure, 10 tons, £103; commercial glacial, 10 tons, £106.

Acetic Anhydride. Ton lots d/d, £136.

Alum, Ground, f.o.r., about £25.
MANCHESTER: Ground, £25.

Aluminium Sulphate. Ex-works, d/d, £15 10s to £18.
MANCHESTER: £16 to £18 10s.

Ammonia, Anhydrous. Per lb., 1s 9d to 2s 3d.

Ammonium Chloride. Per ton lot, in non-ret. pack, £27 to £30 2s 6d.

Ammonium Nitrate. D/d, in 4-ton lots, £31.

Ammonium Persulphate. Per cwt., in 1-cwt. lots, d/d, £6 13s 6d; per ton, in min. 1-ton lots, d/d, £123 10s.

Ammonium Phosphate. Mono-and di-, ton lots, d/d, £106 and £97 10s.

Antimony Sulphide. Per lb., d/d UK in min. 1-ton lots: crimson, 4s 7d to 5s 0½d; golden, 2s 10½d to 4s 3½d.

Arsenic. Ex-store, £45 to £50.

Barium Carbonate. Precip., d/d, 4-ton lots, bag packing, £41.

Barium Chloride. 2-ton lots, £49.

Barium Sulphate [Dry Blanc Fixe]. Precip. 2-ton lots, d/d, £43.

Bleaching Powder. Ret. casks, c.p. station, in 4-ton lots. £30 7s 6d.

Borax. Ton lots, in hessian sacks, c.p. Tech., anhydrous, £66; gran., £45; crystal, £47 10s; powder, £48 10s; extra fine powder, £49 10s; BP, gran., £51; crystal, £56 10s; powder, £57 10s; extra fine powder, £58 10s. Most grades in 6-ply paper bag, £1 less.

Boric Acid. Ton lots, in hessian sacks, c.p. Tech., gran., £74 10s; crystal, £82 10s; powder, £80; extra fine powder, £82; BP gran., £87 10s; crystal, £94 10s; powder, £92; extra fine powder, £94. Most grades in 6-ply paper bag, £1 less.

Calcium Chloride. Ton lots, in non-ret. pack: solid and flake, about £15.

Chlorine, Liquid. In ret. 16-17-cwt. drums d/d in 3-drum lots, £40.

Chromic Acid. Less 2½%, d/d UK, in 1-ton lots, per lb., 2s 2½d.

Chromium Sulphate, Basic. Crystals, d/d, per lb., 8½d; per ton, £79 6s 8d.

Citric Acid. 1-cwt. lots, per cwt., £11 5s.

Cobalt Oxide. Black, per lb., d/d, bulk quantities, 13s 2d.

Copper Carbonate. Per lb., 3s 3d.

Copper Sulphate. F.o.b., less 2% in 2-cwt. bags, £71.

Cream of Tartar. 100%, per cwt., about £11 12s.

Formaldehyde. In casks, d/d, £39 10s.

Formic Acid. 85%, in 4-ton lots, c.p., £89.

Glycerine. Chem. pure, double distilled 1,260 s.g., per cwt., in 5-cwt. drums for annual purchases of over 5-ton lots and under 25 tons, £10 1s 6d. Refined pale straw industrial, 5s per cwt. less than chem. pure.

Hydrochloric Acid. Spot, per carboy, d/d (according to purity, strength and locality), about 12s.

Hydrofluoric Acid. 60%, per lb., about 2s 6d per lb.

Hydrogen Peroxide. Carboys extra and ret. 27.5% wt., £128 10s; 35% wt., d/d, £158.

Iodine. Resublimed BP, under 1 cwt., per lb., 14s 4d; for 1-cwt. lots, per lb., 13s 5d.

These prices are checked with the manufacturers, but in many cases there are variations according to quality, quantity, place of delivery, etc.

Abbreviations: d/d, delivered; c.p., carriage paid; ret., returnable; non-ret. pack., non-returnable packaging; tech., technical; comm., commercial; gran., granular.

All prices per ton unless otherwise stated

Iodoform. Under 1 cwt., per lb., £1 2s 11d, for 1-cwt. lots, per lb., £1 2s 3d.

Lactic Acid. Pale tech., 44% by wt., per lb., 14d; dark tech., 44% by wt., per lb., 9d; chem. quality, 44% by wt., per lb., 12½d; 1-ton lots, ex-works, usual container terms.

Lead Acetate. White, about £154.

Lead Nitrate. 1-ton lots, about £135.

Lead, Red. Basis prices: Genuine dry red, £111 5s: orange lead, £123 5s. Ground in oil: red, £131 15s, orange, £143 15s.

Lead, White. Basis prices: Dry English in 5-cwt. casks, £121; Ground in oil: English, 1-cwt. lots, per cwt., 194s.

Lime Acetate. Brown, ton lots, d/d, £40; grey, 80-82%, ton lots, d/d, £45.

Litharge. In 5-ton lots, £113 5s.

Magnesite. Calcined, in bags, ex-works, about £21.

Magnesium Carbonate. Light, comm., d/d, 2-ton lots, £84 10s under 2 tons, £97.

Magnesium Chloride. Solid (ex-wharf), £17 10s.

Magnesium Oxide. Light, comm., d/d, under 1-ton lots, £245.

Magnesium Sulphate. Crystals, £16.

Mercuric Chloride. Tech. powder, per lb., for 5-cwt. lots, in 28-lb. parcels, £1 1s 9d; smaller quantities dearer.

Mercury Sulphide, Red. 5-cwt. lots in 28-lb. parcels, per lb., £1 9s 3d.

Nickel Sulphate. D/d, buyers UK, nominal, £170.

Nitric Acid. 80° Tw., £35.

Oxalic Acid. Home manufacture, min. 4-ton lots, in 5-cwt. casks, c.p., about £129.

Phosphoric Acid. Tech. (s.g. 1.700) ton lots, c.p., £100; BP (s.g. 1.750), ton lots, c.p., per lb. 1s 4d.

Potash, Caustic. Solid, 1-ton lots, £95 10s; liquid, £36 15s.

Potassium Carbonate. Calcined, 96/98%, 1-ton lots, ex-store, about £74 10s.

Potassium Chloride. Industrial, 96%, 1-ton lots, about £24.

Potassium Dichromate. Crystals and gran., per lb., in 5-cwt. to 1-ton lots, d/d UK, 1s 2½d.

Potassium Iodide. BP, under 1-cwt., per lb., 9s; per lb. for 1-cwt. lots, 8s 6d.

Potassium Nitrate. 4-ton lots, in non-ret. pack, c.p., £63 10s.

Potassium Permanganate. BP, 1-cwt. lots, per lb., 1s 11½d; 3-cwt. lots, per lb., 1s 10½d; 5-cwt. lots, per lb., 1s 10½d; 1-ton lots, per lb., 1s 10d; 5-ton lots, per lb., 1s 9½d. Tech., 5-cwt. in 1-cwt. drums, per cwt., £9 15s 6d; 1-cwt. lots, £10 4s 6d.

Salammoniac. Ton lot, in non-ret. pack, £47 10s.

Salicylic Acid. MANCHESTER: Tech., d/d, per lb., 2s 4d., 1-ton lots.

Soda Ash. 58% ex-depot or d/d, London station, 1-ton lots, about £17 3s.

Soda, Caustic. Solid 76/77%: spot, d/d 1-ton lots, £33 16s 6d.

Sodium Acetate. Comm. crystals, d/d, £91.

Sodium Bicarbonate. Ton lot, in non-ret. pack., £16 10s.

Sodium Bisulphite. Powder, 60/62%, d/d, 2-ton lots for home trade, £46 2s 6d.

Sodium Carbonate Monohydrate. Ton lot, in non ret. pack, c.p., £57.

Sodium Chlorate. 1-cwt. drums, c.p. station, in 4-ton lots. about £85.

Sodium Cyanide. 96/98%, ton lot in 1-cwt. drums, £113 5s.

Sodium Dichromate. Crystals, cake and powder, per lb., 1s. Net d/d UK, anhydrous, per lb., 1s 1½d. Net. del. d/d UK, 5-cwt. to 1-ton lots.

Sodium Fluoride. D/d, 1-ton lots and over, per cwt., £5; 1-cwt. lots, per cwt., £5 10s.

Sodium Hyposulphite. Pea crystals, £38; comm., 1-ton lots, c.p., £34 15s.

Sodium Iodide. BP, under 1 cwt., per lb., 14s 1d; 1-cwt. lots, per lb., 13s 2d.

Sodium Metaphosphate [Calgon]. Flaked, paper sacks, £133.

Sodium Metasilicate. D/d UK in 1 ton lots, 1 cwt. free paper bags, £27 10s.

Sodium Nitrate. Chilean refined gran. over 98%, 6-ton lots, d/d c.p., £29 10s.

Sodium Nitrite. 4-ton lots, £32.

Sodium Perborate. (10%0) in 1-cwt. free kegs, ton lots, £145 15s.

Sodium Percarbonate. 12½% available oxygen, per cwt., in 1-cwt. kegs, £8 10s 9d.

Sodium Phosphate. D/d, ton lots: di-sodium, crystalline, £40 10s, anhydrous, £88; tri-sodium, crystalline, £39 10s, anhydrous, £86.

Sodium Silicate. 75-84° Tw. Lancs and Ches., 4-ton lots, d/d station in loaned drums, £11 17s 6d; Dorset, Somerset and Devon, per ton extra, £3 17s 6d; Scotland and S. Wales, extra, £3. Elsewhere in England, not Cornwall, extra, £1 12s 6d.

Sodium Sulphate [Desiccated Glauber's Salt]. D/d in bags, about £20.

Sodium Sulphate [Glauber's Salt]. D/d, £18 10s to £18 15s.

Sodium Sulphate [Salt Cake]. Unground, d/d station in bulk, £10.
MANCHESTER: d/d station, £9 10s.

Sodium Sulphide. Solid, 60/62%, spot, d/d, in drums in 1-ton lots, £36 2s 6d; broken, d/d, in drums in 1-ton lots, £37 2s 6d.

Sodium Sulphite. Anhydrous, £71 10s; comm., d/d station in bags, £27-£28 10s.

Sulphur. 4 tons or more, ground, according to fineness, £20-£22.

Sulphuric Acid. Net, naked at works, 168° Tw. according to quality, £11-£12 12s 6d; 140° Tw., arsenic free, £9 2s 6d; 140°Tw., arsenious, £8 14s 6d.

Tartaric Acid. Per cwt.: 10 cwt. or more, £14; 1 cwt., £14 5s.

Titanium Oxide. Standard grade comm., rutile structure, £183 5s.; standard grade comm., anatase structure, £167 5s.

Zinc Oxide. Max. for 2-ton lots, d/d, white seal, £94 10s; green seal, £92 10s; red seal, £89 10s.

SOLVENTS AND PLASTICISERS

Acetone. All d/d. In 5-gal. drums, £128 in 10-gal. drums, £118; in 40-45-gal. drums, under 1 ton, £93; 1-5 tons, £90; 5-10 tons, £89; 10 tons and up, £88; in 400-gal. tank wagons, £85.

Butyl Acetate BSS. 10-ton lots, £173.

***n*-Butyl Alcohol BSS.** 10 tons, in drums, d/d, £152.

***sec*-Butyl Alcohol.** All d/d. In 5-gal. drums, £168; in 10-gal. drums, £158; in 40-45-gal. drums, under 1 ton, £133; 1-5 tons, £130; 5-10 tons, £129; 10 tons and up, £128; in 400-gal. tank wagons, £125.

***tert*-Butyl Alcohol.** 5-gal. drums, £195 10s; 40/45-gal. drums: 1 ton, £175 10s; 1-5 tons, £174 10s; 5-10 tons, £173 10s; 10 tons and up, £172 10s.

Diacetone Alcohol. Small lots: 5-gal. drums, £185; 10-gal. drums, £175. 40/45-gal. drums: under 1 ton, £148; 1-5 tons, £147; 5-10 tons, £146; 10 tons and over, £145, in 400 gal. tank wagons; £142.

Dibutyl Phthalate. In drums, 10 tons, d/d, per ton, £225; 45-gal. drums, d/d, per lb., 2s 1d.

Diethyl Phthalate. In drums, 10 tons, per ton, £221; 45-gal. drums, d/d, per lb., 2s 0½d.

Dimethyl Phthalate. In drums, 10 tons, per ton, d/d, £200, 45-gal. drums, d/d, per lb., 1s 10½d.

Dioctyl Phthalate. In drums, 10 tons, d/d, per lb., 2s 8d; 45-gal. drums, d/d, per lb., 2s 9½d.

Ether BSS. 1-ton lots, drums extra, per lb., 1s 11d.

Ethyl Acetate. 10-ton lots, d/d, £145.

Ethyl Alcohol [PB 66 o.p.]. Over 300,000 p. gal. 4s ¼d; d/d in tankers, 2,500-10,000 p. gal., per p. gal., 4s 2¾d. D/d in 40/45-gal. drums, p.p.g. extra, 1d. Absolute alcohol (75.2 o.p.), p.p.g. extra, 5d.

Methanol. Pure synthetic, d/d, £43 15s.

Methylated Spirit. Industrial 66° o.p.: 500-gal. and up, d/d in tankers, per gal., 5s 10½d; 100-499 gal. in drums, d/d, per gal., 6s 3d-6s 5d. Pyridinised 66 o.p. : 500 gal. and up, in tankers, d/d, per gal., 6s 2d; 100-499 gal. in drums, d/d, per gal., 6s 6½d-6s 8½d.

Methyl Ethyl Ketone. All d/d. In 5-gal drums, £183; in 10-gal. drums, £173; in 40-45-gal. drums, under 1 ton, £148; 1-5 tons, £145; 5-10 tons, £144; 10 tons and up, £143; in 400-gal. tank wagons, £140.

Methyl *iso*Butyl Carbinol. All d/d. In 5-gal. drums, £203 ; in 10-gal. drums, £193 ; 40-45 gal. drums, less than 1 ton, £168 ; 1-9 tons, £165 ; 10 tons and over, £163 ; in 400-gal. tank wagons, £160.

Methyl *iso*Butyl Ketone. All d/d. In 5-gal. drums, £209; in 10-gal. drums, £199; in 40-45-gal. drums, under 1 ton, £174; 1-5 tons, £171; 5-10 tons, £170; 10 tons and up, £169; in 400-gal. tank wagons, £166.

***iso*Propyl Acetate.** In drums, 10 tons, d/d, £137; 45-gal. drums, d/d, £143.

***iso*Propyl Alcohol.** Small lots: 5-gal. drums, £118; 10-gal. drums, £108; 40-45 gal. drums: less than 1 ton, £83; 1-9 tons, £81; 10-50 tons, £80 10s; 50 tons and up, £80.

RUBBER CHEMICALS

Carbon Disulphide. According to quality, £61-£67.

Carbon Black. Per lb., according to packing, 8d-1s.

Carbon Tetrachloride. Ton lots, £83 15s.

India-Rubber Substitutes. White, per lb., 1s 8¾d to 2s 0½d; dark, d/d, per lb., 1s 3d-1s 5½d.

Lithopone. 30%, about £59.

Mineral Black. £7 10s-£10.

Sulphur Chloride. British, about £50.

Vegetable Lamp Black. 2-ton lots, £64 8s.

Vermilion. Pale or deep, 7-lb. lots, per lb., 15s 6d.

COAL-TAR PRODUCTS

Benzole. Per gal., min. 200 gal., d/d in bulk, 90's, 5s 3d; pure, 5s 7d.

Carbolic Acid. Crystals, min. price, d/d bulk, per lb., 1s 4d; 40/50-gal. ret. drums extra, per lb., ¼d. Crude, 60's, per gal., 8s 4d.
MANCHESTER: Crystals, d/d, per lb., 1s 4d-1s 7d; crude, naked, at works, 8s.

Creosote. Home trade, per gal., according to quality, f.o.r. maker's works, 1s-1s 9d.
MANCHESTER: Per gal., 1s 2d-1s 8d.

Cresylic Acid. Pale 99/100%, per gal., 6s 6d; 99.5/100%, per gal., 6s 8d. D/d UK in bulk: Pale ADF, per imperial gallon f.o.b. UK, from 7s 8d to 9s 3d; per US gallon, c.i.f. NY, 100 to 118.5 cents freight equalised.

Naphtha. Solvent, 90/160°, per gal., 5s 1d; heavy, 90/190°, for bulk 1,000-gal. lots, d/d, per gal., 3s 11d. Drums extra; higher prices for smaller lots.

Naphthalene. Crude, 4-ton lots, in buyers' bags, nominal, according to m.p.: £19-£30; hot pressed, bulk, ex-works, £40; refined crystals, d/d min. 4-ton lots, £65.

Pitch. Medium, soft, home trade, f.o.r. suppliers' works, £10 10s; export trade, f.o.b. suppliers' port, about £12.

Pyridine. 90/160, per gal., 17s 6d-20s.

Toluole. Pure, per gal., 5s 9d; 90's, d/d, 2,000 gal. in bulk, per gal., 5s.
MANCHESTER: Pure, naked, per gal., 5s 7½d.

Xylole. According to grade, in 1,000-gal. lots, d/d London area in bulk, per gal., 6s 2d-6s 6d.

INTERMEDIATES AND DYES

(Prices Nominal)

***m*-Cresol** 98/100%. 10 cwt. lots d/d, per lb., 4s 9d.

***o*-Cresol** 30/31°C. D/d, per lb., 1s.

***p*-Cresol** 34/35°C. 10 cwt. lots d/d, per lb., 5s.

Dichloraniline. Per lb., 4s 6d.

Dinitrobenzene. 88/99°C., per lb., 2s 1d.

Dinitrotoluene. Drums extra. SP 15°C., per lb., 2s 1½d; SP 26°C., per lb., 1s 5d; SP 33°C., per lb., 1s 2½d; SP 66/68°C., per lb., 2s 1d.

***p*-Nitraniline.** Per lb., 5s 1d.

Nitrobenzene. Spot, 90 gal. drums (drums extra), 1-ton lots d/d, per lb., 10d.

Nitronaphthalene. Per lb., 2s 5½d.

***o*-Toluidine.** 8-10-cwt. drums (drums extra), per lb., 1s 11d.

***p*-Toluidine.** In casks, per lb., 6s 1d.

Dimethylaniline. Drums extra, c.p., per lb., 3s 5d.

TRADE NOTES

ICI Severnside Site

The Minister of Housing and Local Government has given his approval to the planning permission granted by the Gloucester County Council at the end of October to ICI for them to develop a 1,000-acre site on Severnside at Thornbury for a £100 million organic and inorganic plant.

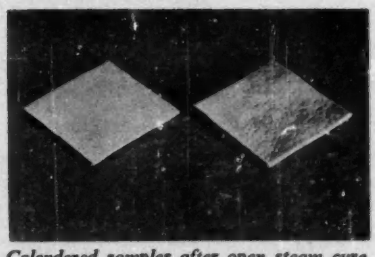
DCL Cut Alcohol Prices

Reductions in the prices of industrial grades of ethyl alcohol varying from 3½d to 9d per imperial gallon are announced by the Distillers Co. Ltd.

Natural Rubber Advance

A NEW type of natural rubber, called Superior Processing Rubber is being developed by the British Rubber Producers' Research Association. It is claimed that it will extrude faster, smoother, and with less die swell, and that after calendering a better surface and gauge closer to setting is obtained. Less degradation of compounds on re-working and reduced sag after pan curing is also claimed for the rubber.

SP rubber was originally developed by the Rubber Research Institute of Malaya, where it is produced by mixing vulcanised and normal Hevea latex, coagulated and worked up into crepe, air dried sheet, and smoked sheet in the conventional way. Details of SP rubber, with compounding data and comparative performance figures are available from the Natural Rubber Development Board, Market Buildings, Mark Lane, London EC3.



Calendered samples after open steam cure. Sample, left, SP rubber less affected by water marking

Pharmaceutical Firm Fined

Beecham Pharmaceuticals Ltd., of Westfield Street, St. Helens, were fined £20 at St. Helens on 18 November for being the occupiers of a factory where a dangerous part of a mixing machine was not securely fenced.

Mr. S Grant, prosecuting, said the case arose out of an accident on 10 October, in which a workman, Vincent Mathew Casson, caught his hand in the rotating blades of a trough-type mixing machine. He lost four fingers.

It was alleged that the defendants failed to fence the blades securely.

Mr. Grant said in fairness to the firm it should be stated that they had ordered a hinged lid with an interlocking device prior to the accident.

Mr. A. S. Booth, defending, said the firm had been operating in St. Helens since 1880 and had an outstandingly good record.

Staff Reduction at Milnsbridge

Some employees at John W. Leitch and Co. Ltd., chemical and dyestuffs manufacturers, Milnsbridge, Huddersfield, are to lose their jobs because of reorganisation. The factory, founded in the late 1880's, was taken into the group controlled by Hickson and Welch (Holdings) Ltd., Castleford, early in 1955. It is believed that work at Milnsbridge is to continue, although the offices have been closed.

Mobil's Leather Oils

The Mobil Oil Co. Ltd. are ending their long-established position as suppliers of specialised leather oils and greases to the UK leather and allied industries. It was felt uneconomic to maintain such a service in the face of increasing imports of leather and the growth of synthetic materials.

Oil Recovery Equipment Contract

Liquid Systems Ltd., of Wellesley Road, Croydon, have signed an agreement with Schlegel Bros. of Stuttgart for the exclusive selling agency in United Kingdom and Eire of their waste oil re-refining and waste oil filtering plants.

This agreement also allows for the sale of these products in the British Commonwealth and other countries.

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CHEMISTS, qualified, aged 25-45, required for the Research and Development laboratories of a light engineering company in East Berkshire. Applicants with the ability to develop a project from its initiation to the production stage would be preferred. The work covers a wide field of applied chemical and electro-chemical problems as well as original research. Commencing salaries in accordance with age and qualifications within the range of £850 to £1,100 with chances of advancement to a higher grade at a later date. Retirement scheme. 5-day week. Write age and full details of past experience in confidence to the Personnel Manager, Box 3579.

FISONS LIMITED have a vacancy in the Central Laboratory at their new Development Station at Bramford, near Ipswich, for a **LABORATORY ASSISTANT.** Applicants should be of Higher National Certificate standard, with considerable skill in chemical analysis and experience of laboratory routines.

Salary in accordance with qualifications and experience.

Those wishing to apply should send a postcard for an Application Form to the Personnel Officer (FX34), **FISONS LIMITED, Harvest House, Felixstowe, Suffolk.**

SITUATIONS VACANT: continued

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